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THE LARGEST MECHANICAL CIRCULATION IN THE WORLD

MACHINERY

PUBLICATION OFFICES 49-55 LAFAYETTE STREET, CORNER LEONARD, NEW YORK

Regular Edition
Vol. 17 No. 12

August 1911

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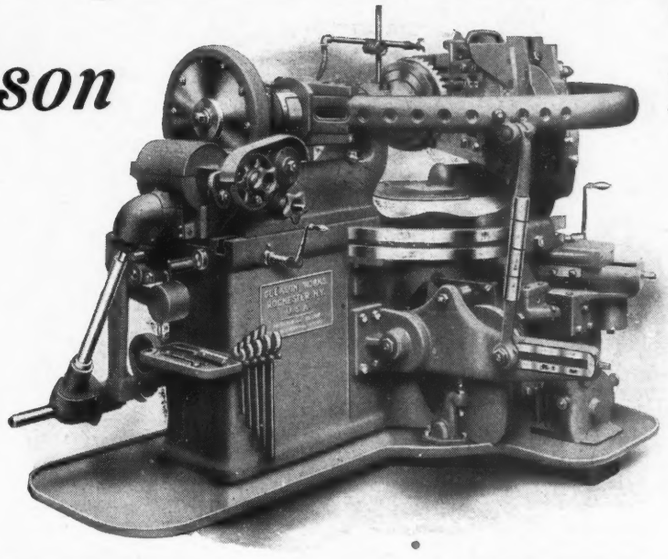
Gleason Gear Planers



18″ Bevel Gear Generator

THIS machine operates with a pair of cutting tools which finish opposite sides of the same tooth, and while one tool is on the forward stroke, the other is on the reverse. This plan doubles the speed of cutting, balances the thrust of the cut and minimizes the vibration. It also avoids the interference of the tools likely to occur near the apex of long face gears, if working in the same direction at the same time.

The cutting sides of these tools represent adjacent teeth on a crown gear of the same pitch as the tooth being planed, and the tools and the blank roll together in the relation of a crown gear mating with a pinion. The tools travel on converging lines, the angle between which is such, that if the lines were prolonged, they would meet at the cone center of the machine.

The advantage of the machine besides the accuracy it gives of tooth contour, is its large output on fine pitch gears, due to the two tools working simultaneously, and the high speed at which they cut.

Gleason Works
Rochester, N. Y.

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Patent Combination Wrench

TRADE B&C MARK

If it impressed you as a poor sort you **bought** some other kind; if it did the work right you asked for the **same** brand.

A Bemis & Call wrench will sell another B. & C. wrench every time because the gripping power and convenience "holds on" in the borrower's mind. Adaptability and Durability make them **hold on** in the **tool kit of the** tool-wise mechanic.

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You can be certain of strict attention to every important point—quality, delivery and price, when we undertake your contract.

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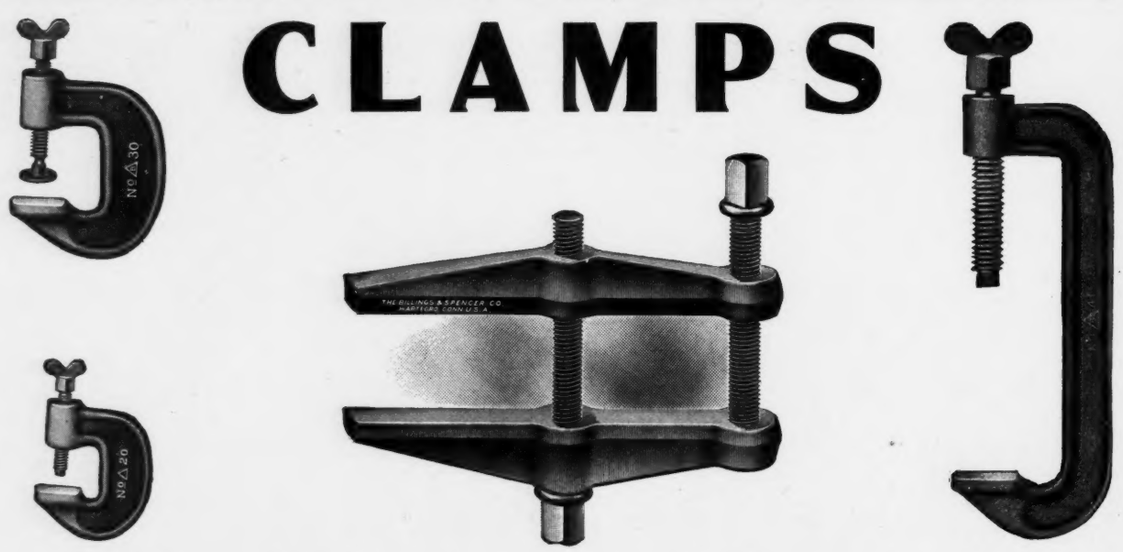

Our Clamps are designed by mechanics, made by mechanics, and used by mechanics in our own shops and in hundreds of other shops. We manufacture various lines, each line particularly adapted to its particular work. "C" Clamps of differing styles and sizes, Tool Makers' "C" Clamps, Machinists' Clamps, Belt Clamps, etc., all sizes carried in stock for immediate delivery. Write for our General Catalog of Machinists' Tools. Also see advertisement on page 66 of this magazine.

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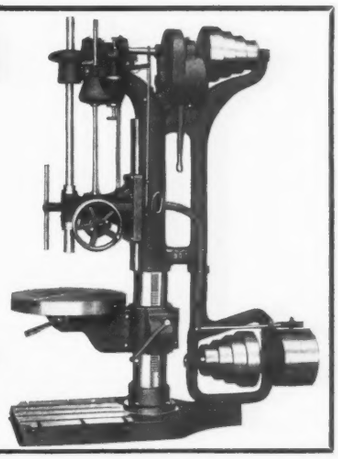
Snyder's New Pattern 30" Upright Drill



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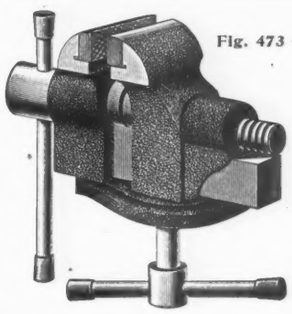

Fig. 473

Holds pipe and general machine work with a grip that will not mar, jam or crush like an ordinary vise.

Note its substantial "make-up" and the five-inch jaws of solid steel cut extra coarse to grip pipe firmly. Jaws open six inches and the vise weighs 80 lbs.

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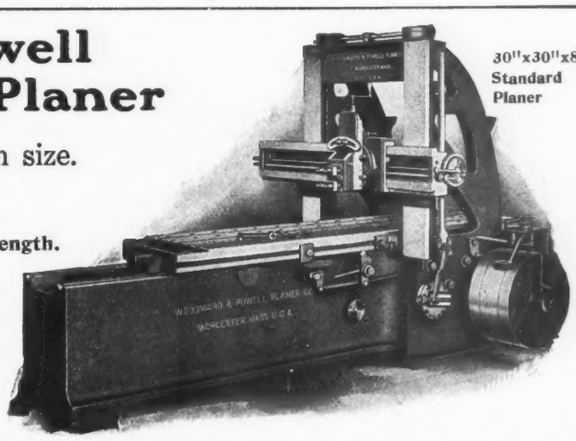

30"x30"x8' Standard Planer

is a popular machine for work of medium size. A postal brings descriptive circular.

We build planers in sizes from 24" x 24" to 60" x 60", any length.

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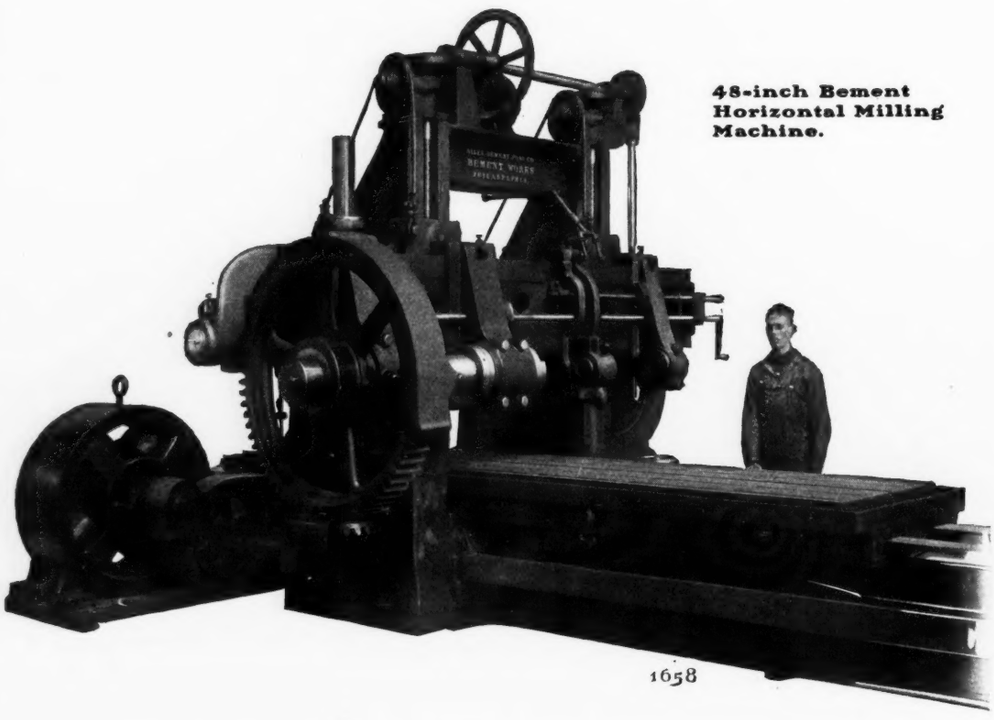
Backed up by a massive, consistent construction—that cannot give or vibrate or chatter



48-inch Bement Horizontal Milling Machine.

1658

The same, steady action, cut after cut—that is the essential that shows up a machine's rigidity, strength, power—that establishes the economy basis for heavy work. No shut downs for repairs or adjustments—the only thing that can give is the cutter.

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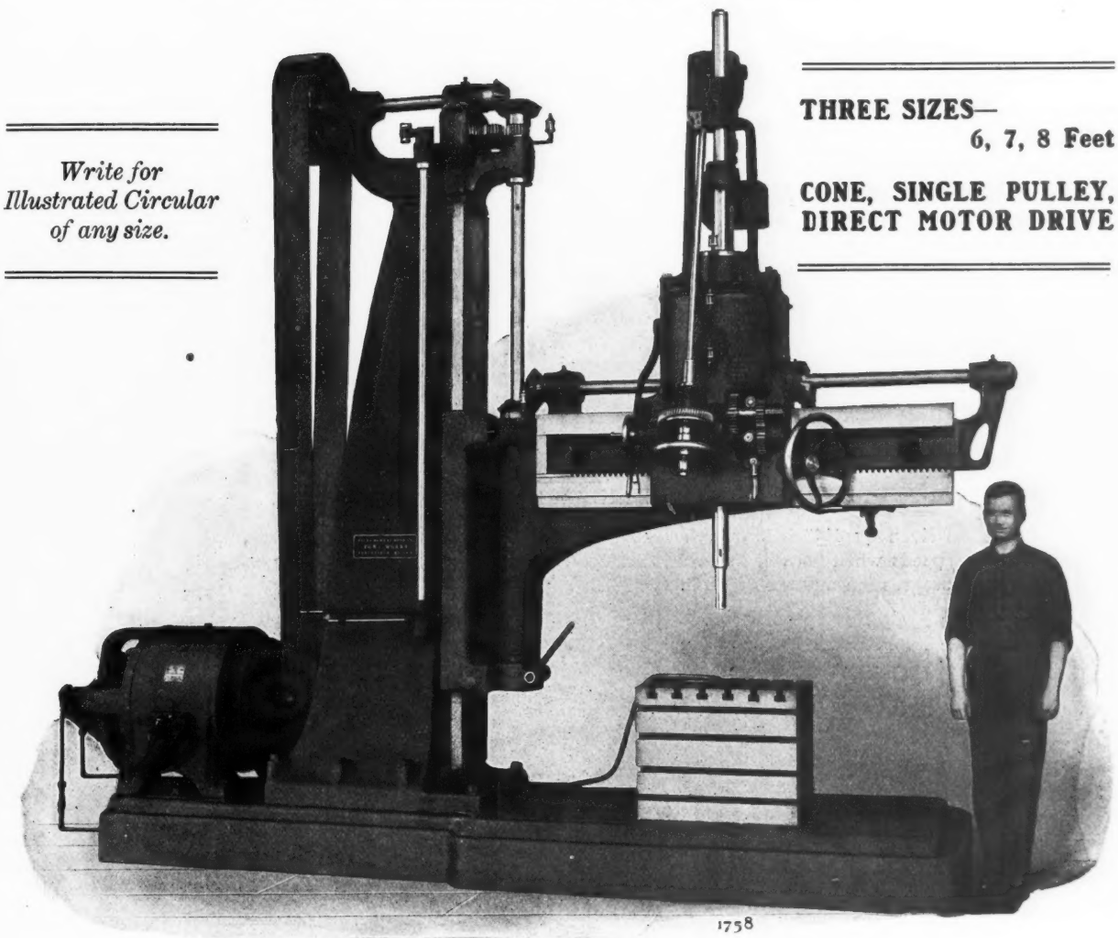

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All gears steel or bronze. All bearings bronze lined and self-oiling.

Arm is mounted on long slide and is supported on ball bearings.

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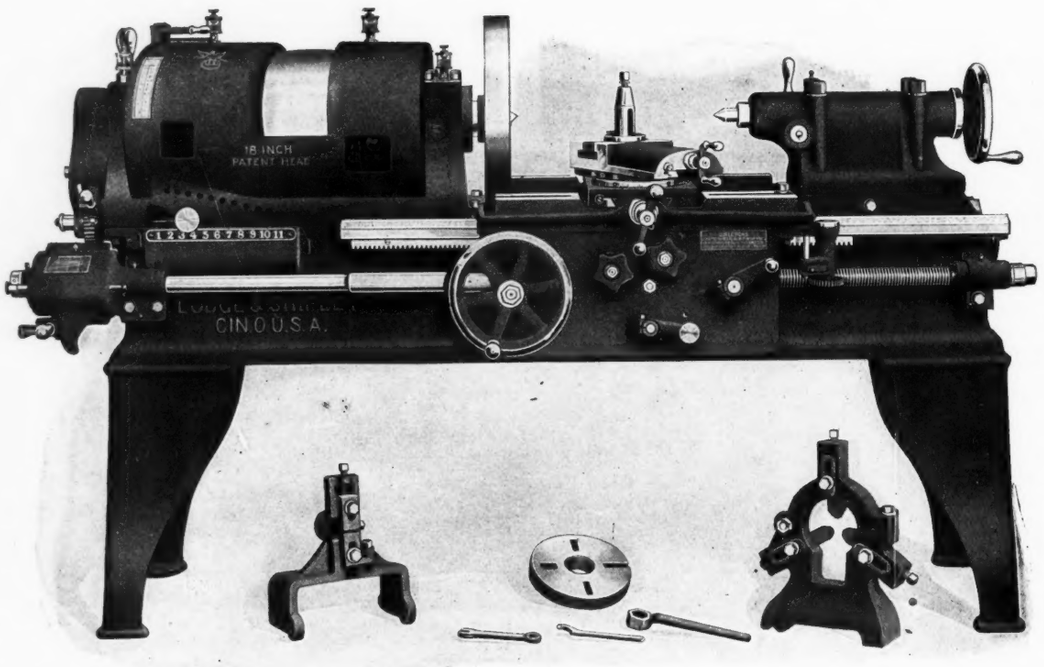

18" PATENT HEAD SCREW CUTTING ENGINE LATHE

Driven by 4½" belt over headstock pulley 12" in diameter. Eighteen spindle speeds when both countershaft pulleys are run forward, all in proper geometric progression and six of them open belt speeds.

A Finishing Cut with the open belt produces work more nearly round than a cut driven through gearing. It means less time on the grinder—better work—more work.

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Open Belt Cuts do not leave gear marks in the work and do not abuse the tool.

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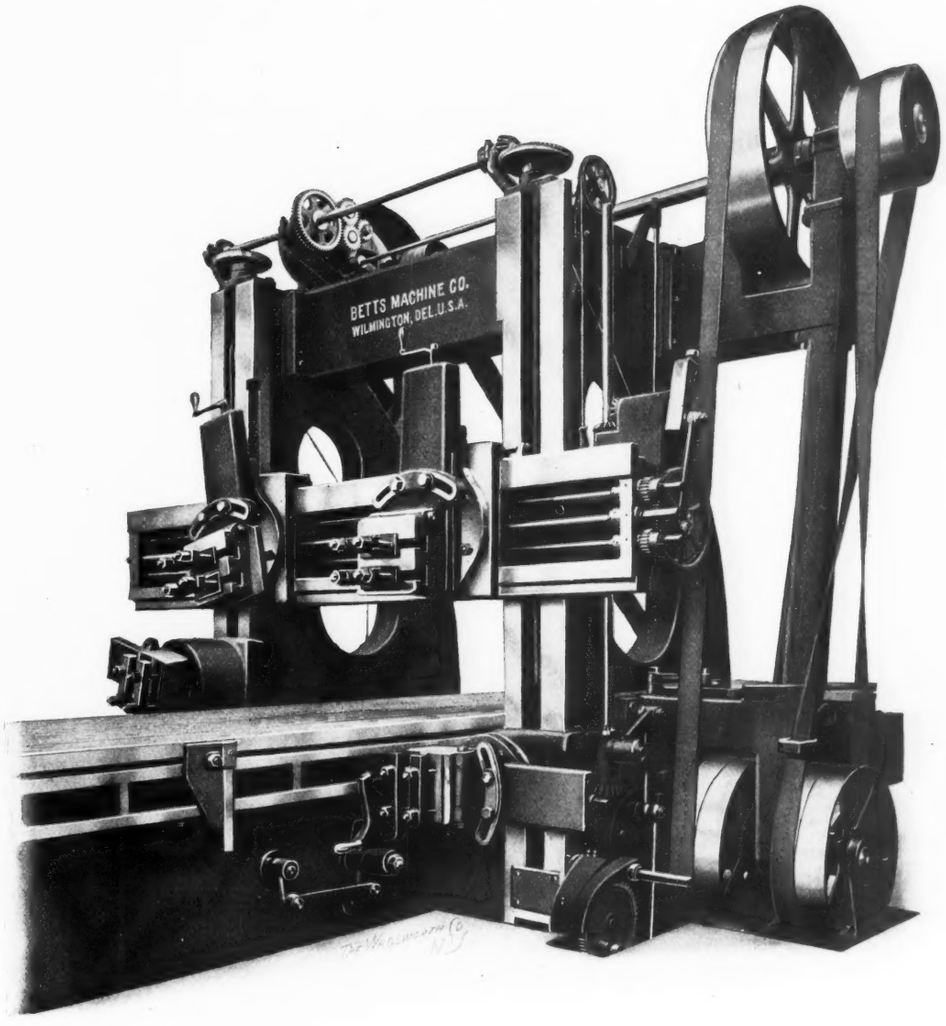

54-Inch Planing Machine, as arranged with Belt-Connected Motor Drive for the Kansas City Southern R. R. Co., Shreveport, La.

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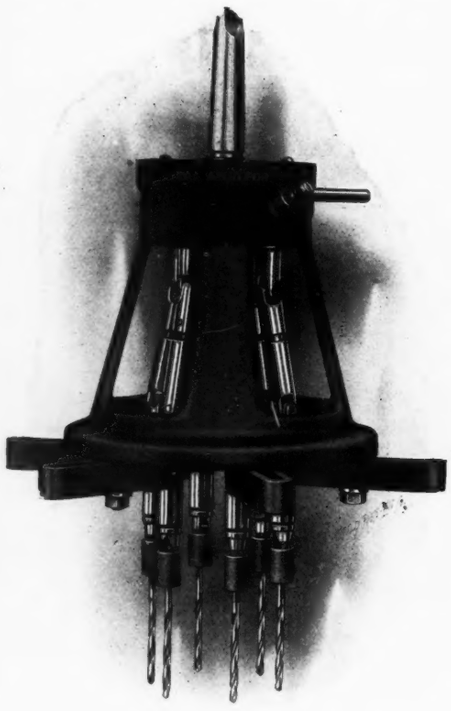

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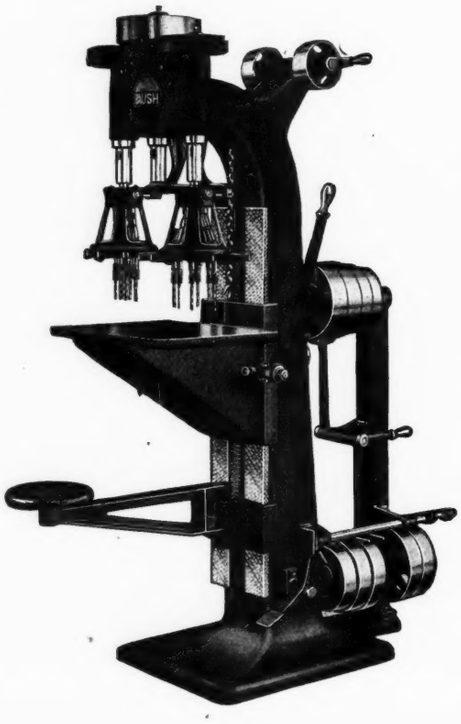
We shall be glad to send full details of the small Multi-Drill Head and the 3-A Machine—if you will write us.



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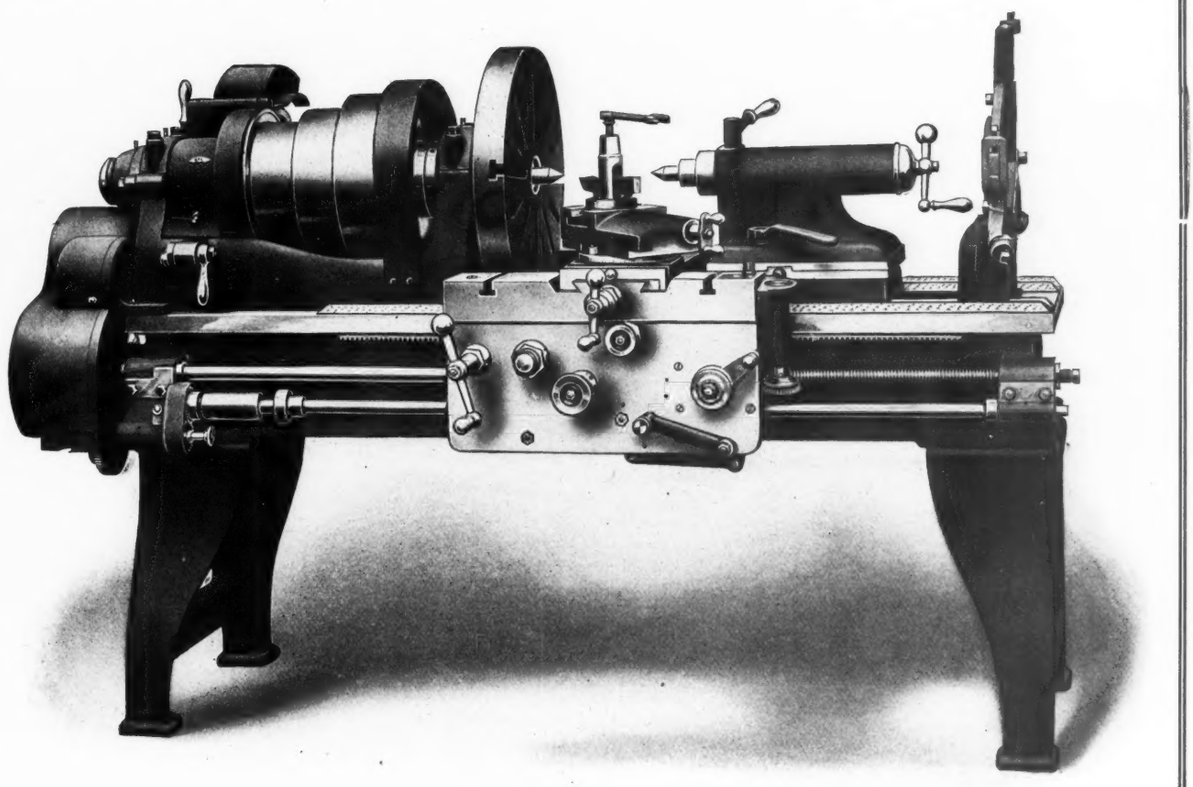

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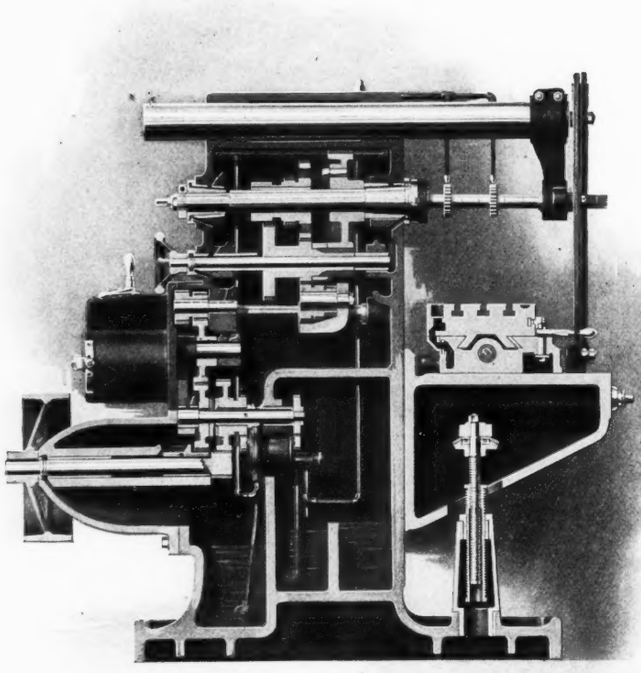

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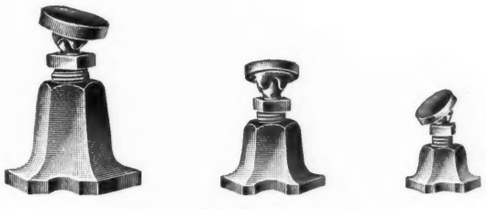

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Cable Address: Defries, Dusseldorf; Lieber's; A B C, 5th edition; Western Union Codes.

M. KOYEMANN, Dusseldorf.
IMPORTER OF AMERICAN MACHINE TOOLS.

F. G. KRETSCHMER & CO., Frankfurt a/Main.
IMPORTERS AMERICAN MACHINE TOOLS.
Cable: "Micrometer Frankfurtmain." Lieber's and A B C Codes.

VOGEL & SCHEMMANN,
Kabel-Hagen-Westphalia (Industrial Center).
IMPORTERS OF AMERICAN MACHINERY AND SMALL TOOLS.

HOLLAND

Ls: N. ALTA & CO., Amsterdam.
ENGINEERS AND IMPORTERS OF MACHINERY.

PECK & COMPANY, Amsterdam.
IMPORTERS OF AMERICAN MACHINERY.
Tools, Factory Supplies. Lieber's and A B C Codes.

FRED. STIELTJES & CO., Amsterdam.
ENGINEERS AND IMPORTERS OF AMERICAN MACHINERY.

H. G. AIKEMA & CO., Rotterdam.
ENGINEERING AGENTS AND MERCHANTS.
Importers of American Machinery and Tools.

SPLIETHOFF, BEEUWKES & CO., Rotterdam.
ENGINEERING AGENTS AND MERCHANTS.

HOLLAND

R. S. STOKVIS & ZONEN, Ltd.
MECHANICAL ENGINEERS, TECHNICAL DEPARTMENT II.
Rotterdam (Amsterdam, Brussels and Soerabaya).
Established 1847. Cable: "Metallicus."
MACHINERY AND TOOLS.

VAN RIETSCHOTEN & HOUWENS,
West Zeedyk, 554, Rotterdam.
LARGEST DEALERS IN AMERICAN MACHINERY in Holland. New showroom, 11,000 sq. feet. Cable: "Machinery." Codes used: ABC, 5th edition; Lieber's.

WYNMALEN & HAUSMANN, Rotterdam.
ENGINEERING AGENTS AND MERCHANTS.
Glashaven, 4-14. Established 1875. Special Tools, Metal and Wood Working Machinery.

ITALY

GRIMALDI & C., Casella 320, Genova.
AMERICAN MACHINERY AGENTS.
Branch House in Milan, Italy.

DE FRIES & CO.,
Via Principe Umberto Angolo Via Moscova, Milan.
IMPORTERS AMERICAN MACHINERY AND TOOLS.

ALFRED HERBERT, Ltd., Milan.
19 Via Pontaccio.
IMPORTERS OF AMERICAN LABOR SAVING TOOLS OF ALL DESCRIPTIONS.
Cable: "Herbert, Milan." Codes: Lieber's, A B C 5th edition, and private.

ALFRED H. SCHÜTTE,
Viale Venezia, 22, Milan. Via Alfieri, 4, Turin.
MACHINERY AND TOOLS.

STÜSSI & ZWEIFEL, Via Dante 8, Milan.
IMPORTERS OF AMERICAN MACHINERY.

ING. ERCOLE VAGHI,
MACHINE TOOLS. Corso Porta Nuova 34, Milan.

W. VOGEL, Piazza Castello 3, Milan
AGENT FOR AMERICAN MACHINERY.

INGR. A. BALDINI & CI. Pontedera.
IMPORTERS OF AMERICAN MACHINES AND TOOLS.
Telegrams: Macchine, Pontedera. Codes: Lieber's and A B C 5th edition.

FENWICK FRERES & CO.,
6 Via Lagrange, Turin
AMERICAN MACHINERY AND TOOLS.

JAPAN

SCHUCHARDT & SCHÜTTE,
14, Akashicho Tsukyi, Tokio.
MACHINERY AND TOOLS.

ALFRED HERBERT, Ltd.,
14, Yamashita-Cho, Yokohama.
IMPORTERS OF AMERICAN LABOR SAVING TOOLS OF ALL DESCRIPTIONS.
Cable: "Lathe, Yokohama." Codes: Lieber's, A B C 5th edition, and private.

RUSSIA

SCHUCHARDT & SCHÜTTE,
Newsky Prospect 11, St. Petersburg.
MACHINERY AND TOOLS.

GRÉGOIRE WEINBERG & ALEXANDER POSNER ENGINEERING CO.
Newsky Prospect, 47-1 St. Petersburg.
MACHINERY, TOOLS, HYDRAULIC MACHINERY.
Cranes and Gas Engines. Cable Address: "Greweco."

SPAIN

LA MAQUINARIA ANGLO-AMERICANA,
R. d'Aulignac. Cortes 559—Barcelona.
MACHINERY, TOOLS AND SUPPLIES.

ALFRED H. SCHÜTTE,
Calle Lauria 18, Barcelona.
Gran Via 29, Bilbao.
MACHINERY AND TOOLS.

SWEDEN

SAM LAGERLOF'S MACHINE-BUREAU, Stockholm.
SPECIALTY: MACHINE TOOLS.
Cable: "Machinlagerlof." A B C and Lieber's Code.

AKTIEBOLAGET V. LÖWENER,
Vasagatan 14, Stockholm.
MACHINERY AND TOOLS.

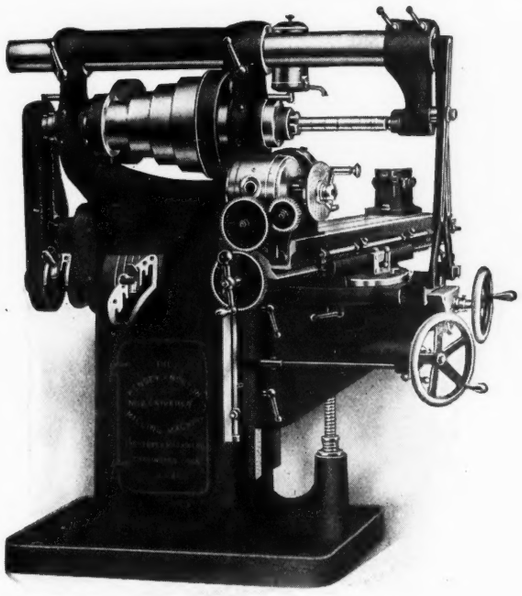
SCHUCHARDT & SCHÜTTE,
Vasagatan N. R. 24, Stockholm.
MACHINERY AND TOOLS.

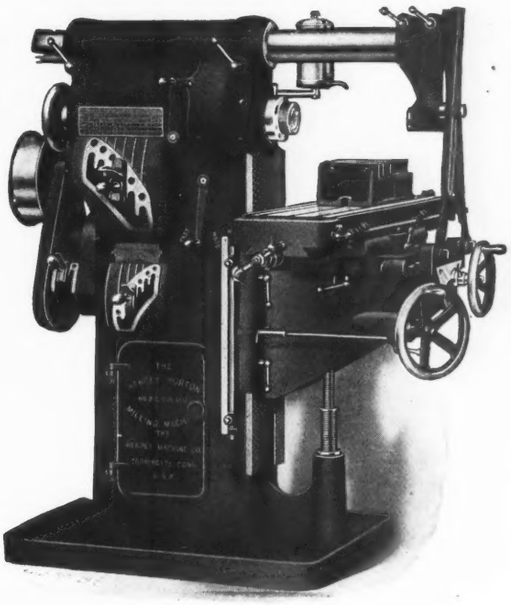
SWITZERLAND

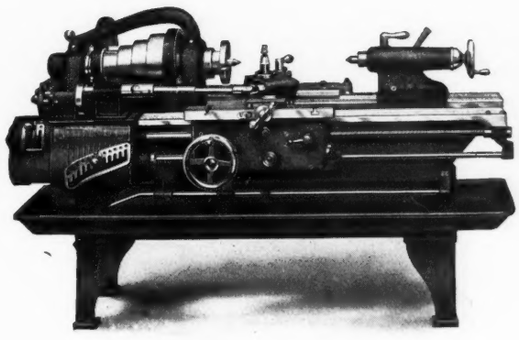
J. LAMBERCIER & CIE, Geneva.
IMPORTERS OF AMERICAN MACHINERY.
Technical Appliances.

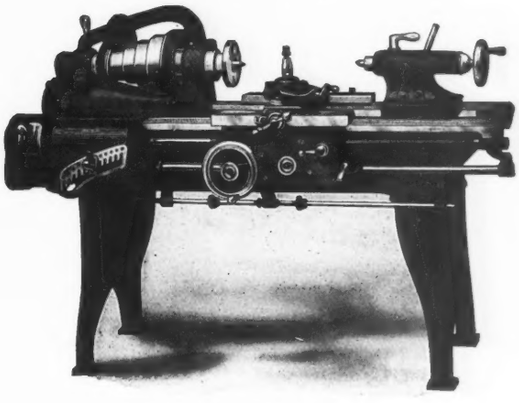
THE AMERICAN MACHINERY IMPORT OFFICE, 24, Weinbergstrasse, Zurich.

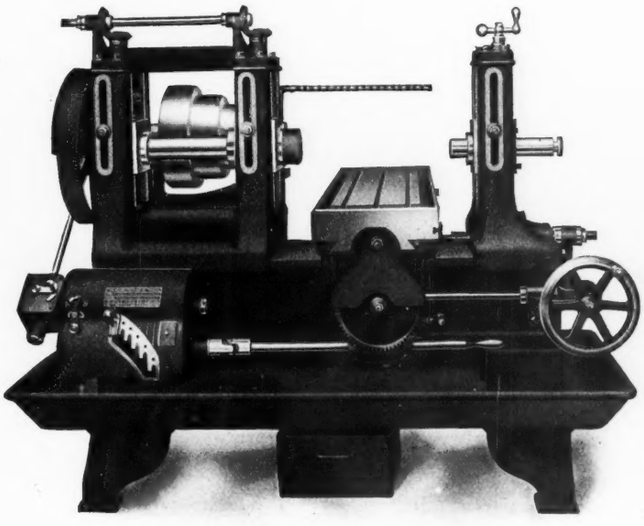
STANDARD Machine Tools for Tool Room Work and Manufacturing Operations. Lathes 12 to 32" Swing, Milling Machines Nos. 1 to 4, Lincoln Millers two sizes, Shapers 15, 20, 24 and 28" Stroke.

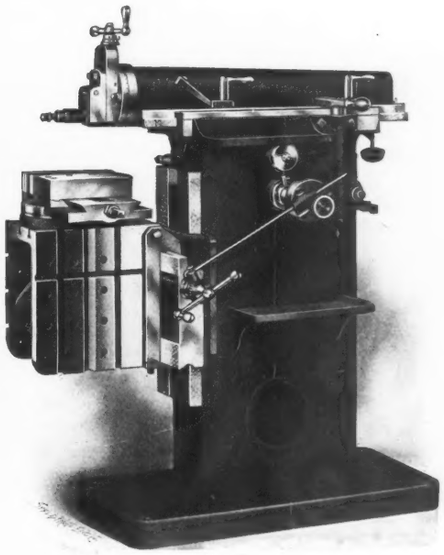










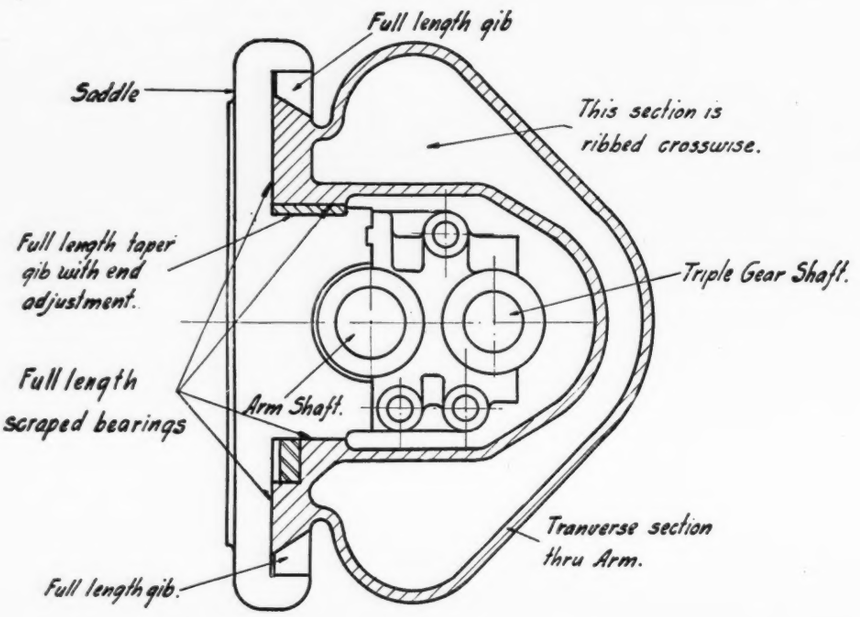


THE HENDEY MACHINE CO., Torrington, Conn., U. S. A.

A STRONG ARM

is always desirable, but especially so on a

FULL UNIVERSAL RADIAL



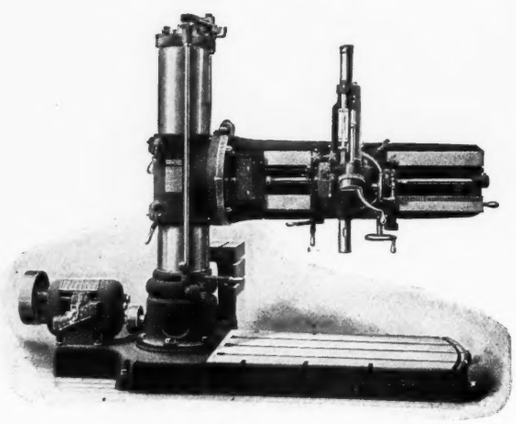
Reinforced Double Section Arm Construction

It can readily be seen from the above sectional view that the arm of the "American" Full Universal Radial is made in the form of Upper and Lower Tube Sections, firmly bound together in the back for their entire length by a *Double Wall* of Metal, and further reinforced by heavy transverse ribbing.

The Saddle has exceptionally large bearings on the "ways" and can be firmly locked in position by a clamping device which binds together the arm sections and the saddle into a very compact unit; thus all strains are equally distributed to every part of the arm.

This unquestionably forms the most rigid construction possible for resisting all torsional and bending strains. In fact, we positively guarantee the Arm of the "American" Full Universal Radial to be equally as Rigid as that of any Standard Plain Radial of corresponding size.

This is only one of the valuable features; our Circular No. 365 will tell you the rest.



"American" Full Universal Radial

THE AMERICAN TOOL WORKS COMPANY

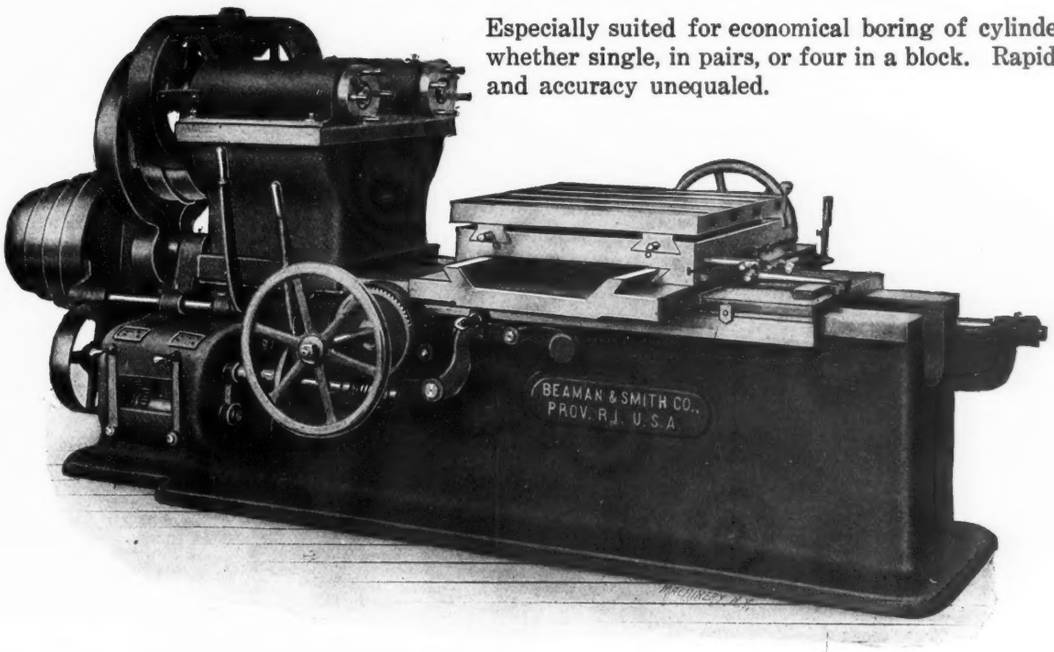
LATHES PLANERS CINCINNATI, U. S. A. SHAPERS RADIALS

Beaman & Smith Automobile Boring Machines

Particularly Well Designed to Meet Exacting Conditions

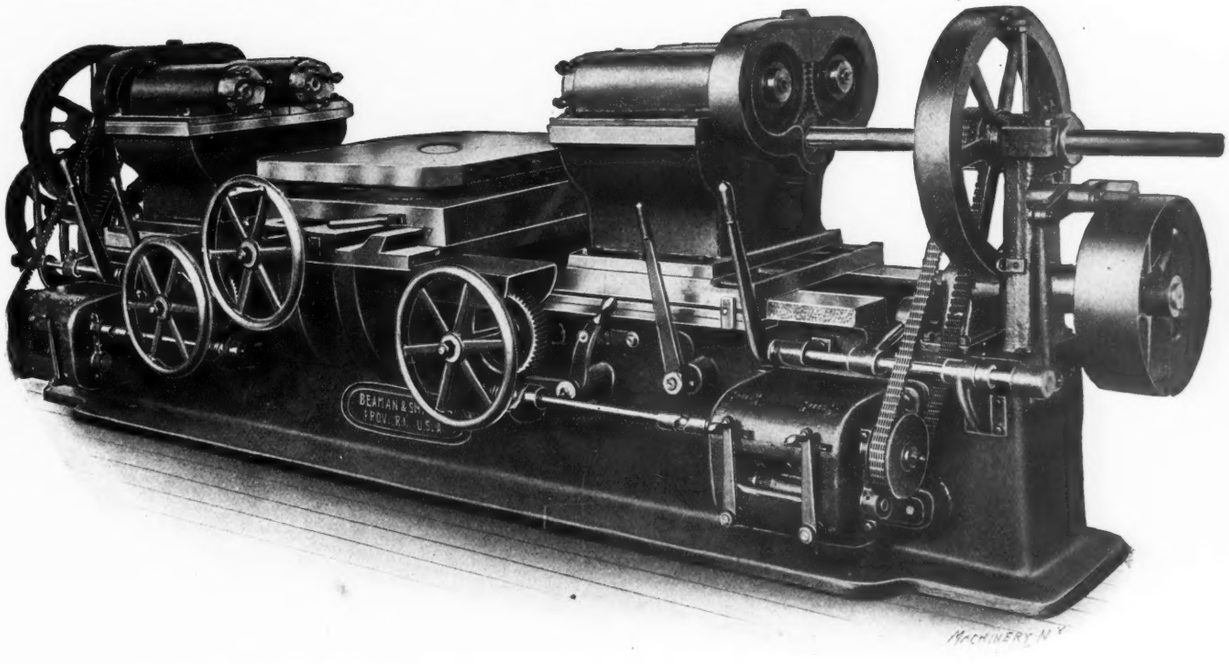
Standard Automobile Cylinder Boring Machine

Especially suited for economical boring of cylinders, whether single, in pairs, or four in a block. Rapidity and accuracy unequaled.



Four Spindle Cylinder Boring Machine

Very powerful and efficient. Revolving table three feet square, with four indexed positions, makes practically continuous operation possible.



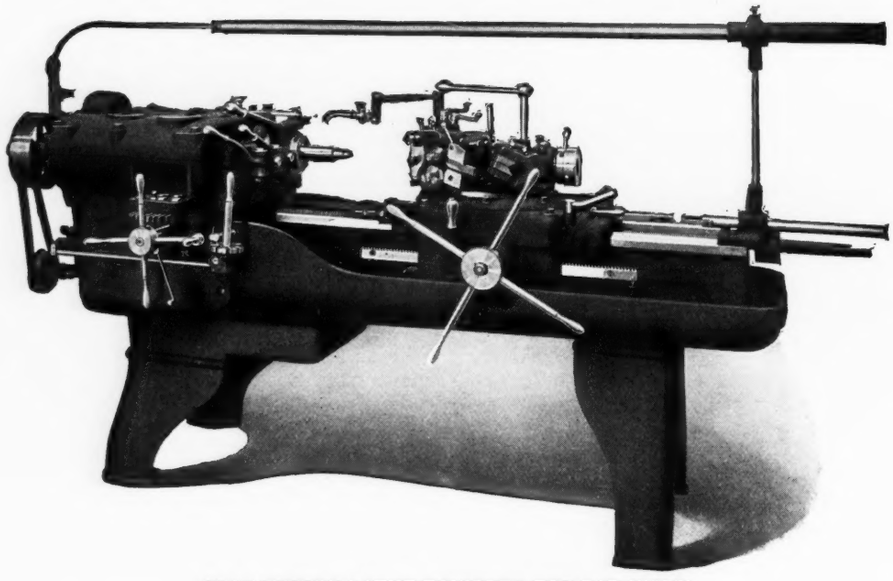
Our catalog will interest you.

THE BEAMAN & SMITH CO., Providence, R. I., U. S. A.

Manufacturers of Special Machine Tools, especially Milling and Boring Machines

AGENTS—Chas. Churchill & Co., London. Ludw. Loewe & Co., Berlin. Fenwick Freres & Co., Paris.

There are More than "57 FLAT TURRET



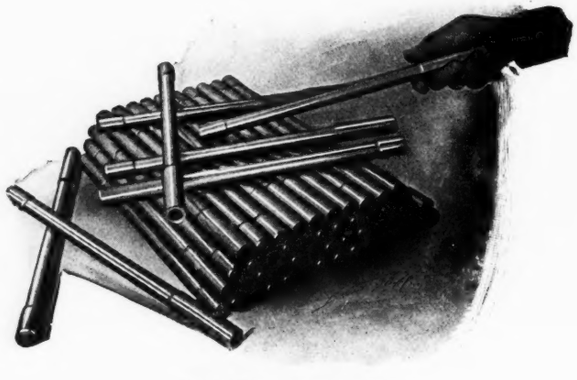
FLAT TURRET LATHE EQUIPPED FOR BAR WORK

Our claims have the most substantial and imposing array of facts behind them. We have endeavored to give these facts exhaustively in our literature. Some of them follow, expressed briefly so that you may take a "wing shot" at them:

Reason No. 1. The Flat Turret Lathe is the only lathe having a cross sliding head, all others being obliged to resort to mounting the turret on two slides to get the same movements.

Reason No. 2. It is the only turret lathe built on the single slide principle, which gives the most accurate, powerful and convenient control of both work and tools.

Reason No. 3. Its stop mechanism is remarkable for its precision, owing to the slide being always fed



WORK FROM THE BAR

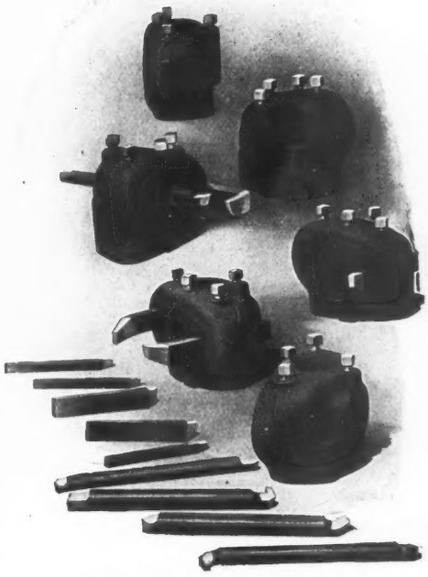
Springfield, Vermont, U. S. A. **Jones & Lamson**

France and Spain, Ph. Bonvillain and E. Ronceray, 9 and 11 Rue des Envierges, Paris. Italy, Adler & Eisenschitz, Milan.

Varieties" of Reasons for LATHE Supremacy

firmly against a positive stop with an accurately measured pressure, thus insuring exact shoulder lengths.

Reason No. 4. The flat turret gives the most natural tool support, both as to security and convenience in grouping.



TOOLS AND TOOL HOLDERS

AND NOTE THESE ECONOMICAL REASONS ESPECIALLY

Reason No. 5. The Flat Turret Lathe is as easily and quickly adjustable as the handiest engine lathe, and yet gives *three times* the latter's output.

Reason No. 6 It can, in sharp contrast to the automatic, be used on short runs as economically as on long ones.

Reason No. 7. It duplicates as accurately as the automatic and yet does not require the many costly, soon-obsolete, special tools demanded by that type.

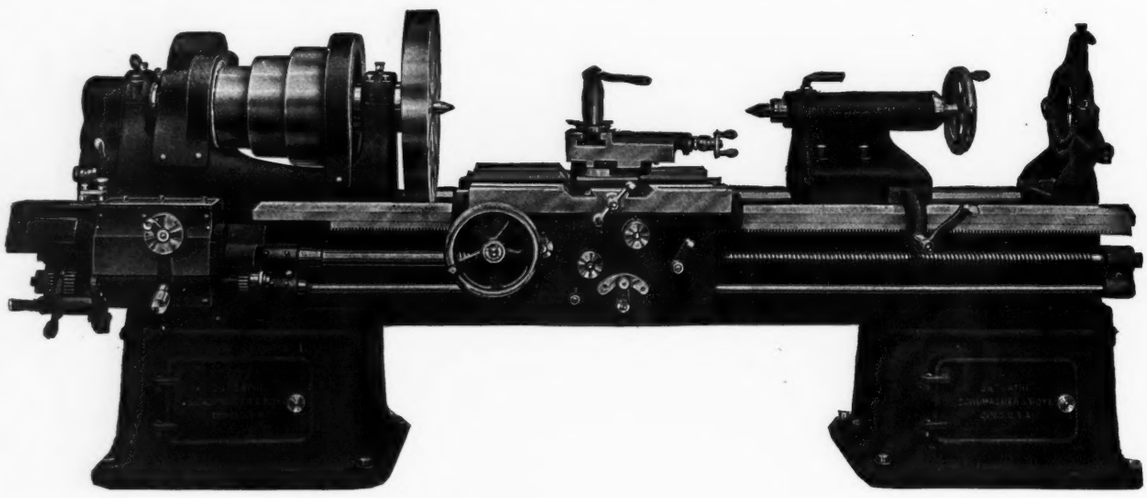
CHUCKED WORK

Reason No. 8. It gives (as we are prepared to prove) the largest output per dollar of investment—the supreme test of any machine tool.

The rest of the "57" reasons—and some more—for the supremacy of the FLAT TURRET LATHE, you will find in our literature. Or shall we send a representative to figure economies with you?

Machine Company **Queen Victoria St., London, Eng.**

Germany, Holland, Belgium, Switzerland, Austria-Hungary, M. Koyemann, Charlottenstrasse 112, Dusseldorf, Germany.

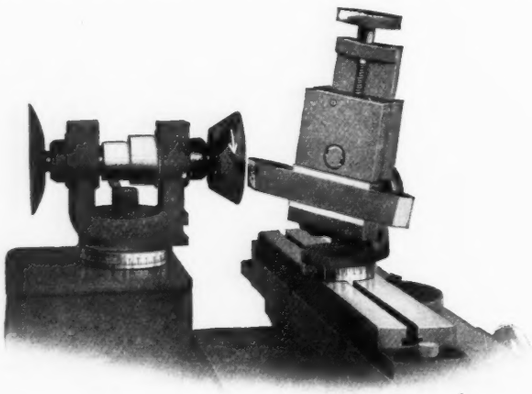


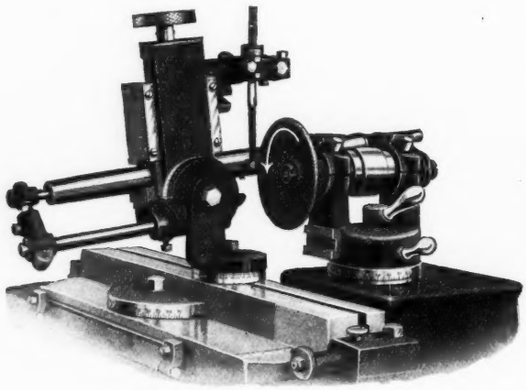
Twenty-four Inch Instantaneous Change Gear Engine Lathe
Double Back Geared Double Plate Apron

SCHUMACHER & BOYE

Engine Lathes, 18″ to 48″ Swing **CINCINNATI, OHIO, U. S. A.**

Oesterlein No. 2 Universal Cutter and Tool Grinder





The cuts above illustrate the vise supplied with the Oesterlein Grinder. It will clamp flat or round stock, taper or straight. It swivels in any angle in two planes. A base for the vise is also supplied to clamp it horizontally on table. This vise is very convenient for an endless variety of operations.

Our catalog will do you good.

THE OESTERLEIN MACHINE COMPANY, Cincinnati, Ohio

AGENTS—Hill, Clarke & Co., Boston, Chicago, New York, Philadelphia and Cleveland. M. I. Hibbler Machine Supply Co., Rochester. Mine & Smelter Supply Co., Denver. Fairbanks Co., Pittsburg and Buffalo. Compressed Air Machinery Co., San Francisco. Pacific Coast Mfg. Co., Los Angeles. Toronto.

Cincinnati Planer Two-Speed Belt Drive

Designed for use with planers from 22" to 36" inclusive.

This Two-Speed Drive

was developed to meet the demand for more than one planer speed, and for simplicity and convenience is quite without a rival.

It provides two cutting speeds to the table and a constant return. Any two speeds desired can be secured, and change from one speed to the other is accomplished instantly and while the machine is running.

Without going into details the Drive may be described as consisting of two sets of pulleys, one keyed to the shaft, and the other a wide faced pulley running loose on the shaft; both of these are driven by independent belts from the line shaft, which run at different speeds. The usual heavy return pulley and the cutting pulley are also used, and a conveniently placed lever at the side of the housing controls both speeds.

The operation of this device, like all Cincinnati Planer features, is simple, practical and efficient.

The catalogue gives details and shows full line of Planers.

CINCINNATI PLANER CO., Cincinnati, Ohio

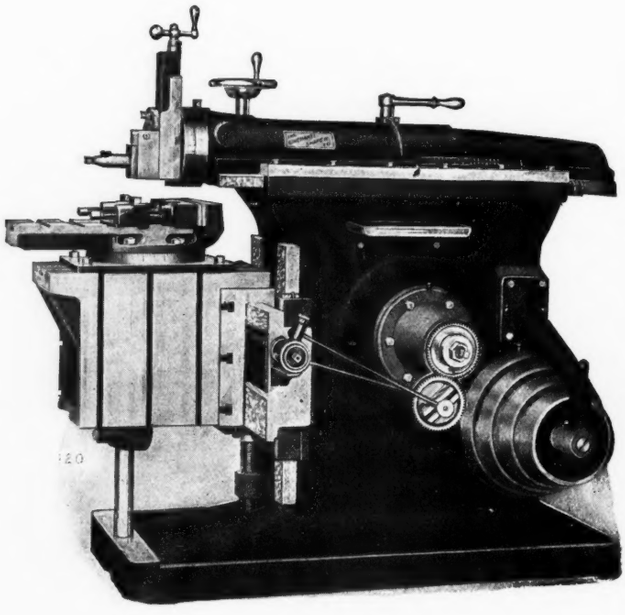
DOMESTIC AGENTS—Prentiss Tool & Supply Co., New York, Syracuse, Buffalo, Rochester, Boston and Scranton, Pa. Marshall & Huschart Mchy. Co., Chicago, Milwaukee, St. Louis and Indianapolis. Motch & Merryweather Mchy. Co., Cleveland, Cincinnati and Detroit. W. E. Shipley Mchy. Co., Philadelphia, Pa. Baird Mchy. Co., Pittsburg, Pa. Harron, Rickard & McCone, San Francisco and Los Angeles, Cal. Hallidie Mchy. Co., Seattle and Spokane. Robinson, Cary & Sands Co., St. Paul and Duluth. Zimmerman, Wells, Brown Co., Portland, Oregon. Gallagher Mchy. Co., Salt Lake City. Hendrie & Bolthoff Co., Denver, Colo. Dewstoe Machine Tool Co., Birmingham, Ala. Kemp Machinery Co., Baltimore, Md.

FOREIGN AGENTS—Ludw. Loewe & Co., Berlin. R. S. Stokvis & Zonen, Rotterdam, Holland, and Brussels, Belgium. J. Lambercier & Co., Geneva, Switzerland. Ing. Ercole Vaghi, Milan. Donauwerk Ernst Krause & Co., Vienna, Austria. Andrews & George, Yokohama, Japan. Thos. McPherson & Son, Melbourne, Australia. Adolfo B. Horn, Havana, Cuba.

The Installation of

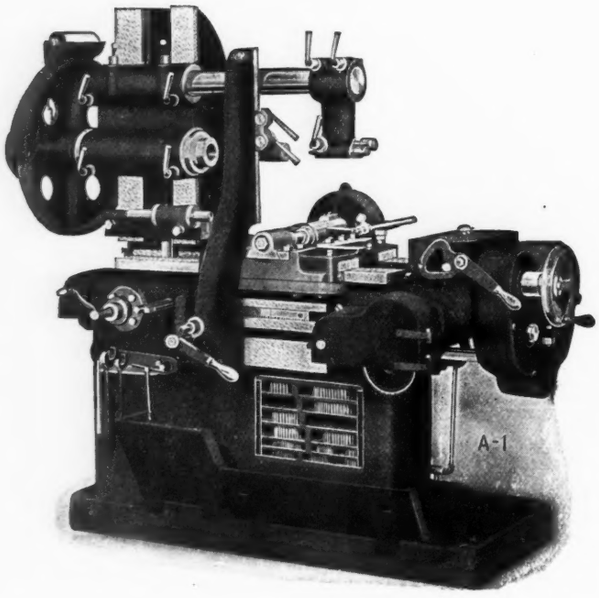
"Cincinnati" Heavy Duty Shapers

will avoid future Shaper troubles



The Cincinnati Shaper Co., Cincinnati, Ohio

AGENTS: Manning, Maxwell & Moore, Inc., New York, Philadelphia, Chicago, Boston, St. Louis, Syracuse, Detroit, Cleveland, Atlanta, Buffalo, Milwaukee, Indianapolis, and Mexico City. Brown & Zortman Machinery Co., Pittsburg. The National Supply Co., Toledo, O. Eccles & Smith Co., San Francisco, Cal. Smith, Booth, Usher Co., Los Angeles, Cal. Hallidie Machinery Co., Seattle, Wash. Zimmerman, Wells, Brown & Co., Portland, Oregon. C. T. Patterson Co., Ltd., New Orleans, La. Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne, Glasgow. A. H. Schutte, Brussels, Cologne, Bilbao, Paris, Liege, Milan. Donauwerk Ernst Krause & Co., Vienna, Prague and Budapest. H. W. Petrie, Ltd., Toronto, Montreal and Vancouver. Thos. McPherson & Son, Melbourne. Andrews & George, Yokohama.



Accuracy, Production and Convenience

are to be found in

"Cincinnati" Gear Cutters

to a greater degree than in competing machines

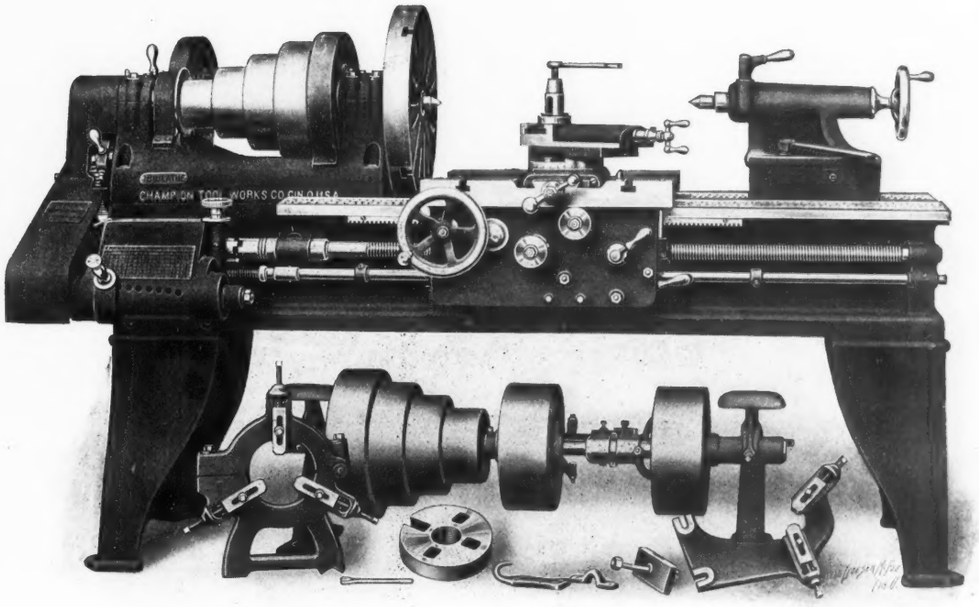
The Cincinnati Gear Cutting Machine Co.

Elam St. and Garrard Ave., Cincinnati, Ohio

AGENTS: Manning, Maxwell & Moore, Inc., New York, Boston, Chicago, Philadelphia, Pittsburgh, St. Louis, Cleveland, Syracuse, Atlanta, Buffalo, Mexico City, Milwaukee and Detroit. Donauwerk Ernst Krause & Co., Vienna, Prague and Budapest. Andrews & George, Yokohama.

18-Inch Quick Change Gear

CHAMPION LATHE



SCIENTIFIC MANAGEMENT

Simply means, getting the most for your money.

This much talked of topic is not a mere dream but has been a proven actuality in many instances. And there is no better place to prove it than where the management is content with present and past performers.

If you're going to try it, can you afford to handicap your employees with new or old tools of obsolete pattern? No, you will want the best and most improved, practical machines you can buy.

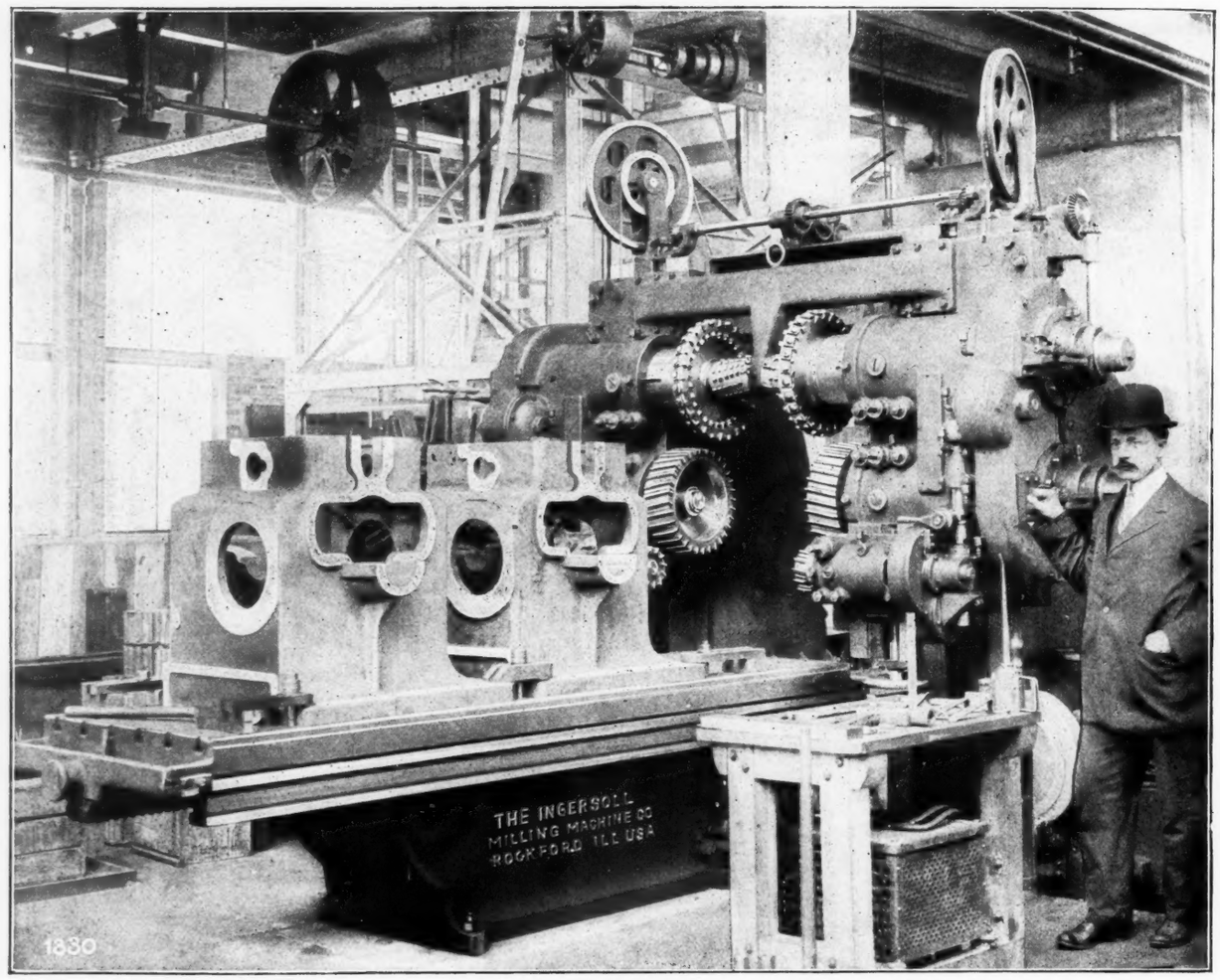
CHAMPION LATHES, as a part of your equipment, will be a big factor in helping you to an ideal condition, as the practical design of these tools commends them at once to the experienced engineer for the latest and best Lathe Work. They have the most improved Quick Change Gear device, Chasing Attachment for the rapid duplication of threads, two way Automatic Stop, completely Guarded Gears, and all other features which count for real economy and accurate, lasting service.

Get our Catalogue and Prices of 10, 12, 14, 16 and 18-inch Lathes, with and without Taper and other Attachments, and analyze our proposition for yourself.

CHAMPION TOOL WORKS CO.

2422 SPRING GROVE AVENUE CINCINNATI, OHIO

GETTING RESULTS ON AN INGERSOLL



One of the Ingersoll Milling Machines in the International Harvester Co., Tractor Works.

The above illustration taken in a plant of one of the greatest manufacturing organizations in the world is concrete evidence of the unequaled efficiency of Ingersoll Milling Machines. Thirteen different surfaces, requiring cutters as large as 20″ diameter by 6″ face, are milled complete in two operations on an Ingersoll. In the first operation, $\frac{5}{8}$″ iron is removed from each of seven surfaces, and twelve bases are milled in ten hours. In the second operation, above illustrated, $\frac{1}{2}$″ iron is removed from each of six surfaces, and fourteen bases are finished in ten hours.

It is milling The Ingersoll Way and not planing that gives such a production.

THIS IS INGERSOLL SERVICE

Perhaps you are interested in cutting down your cost of manufacturing. Most "Progressives" are.

If it's Milling, then take it up with Ingersoll.

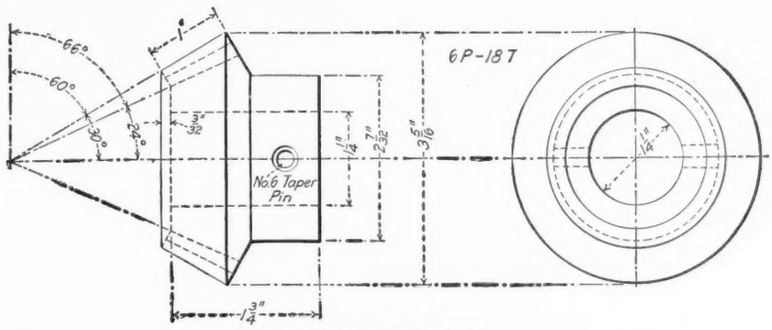
THE INGERSOLL MILLING MACHINE COMPANY

ROCKFORD, ILLINOIS, U. S. A.

Main Office and Works: Rockford, Ill. **New York Office: 50 Church St., The Walter H. Foster Co., Managers.**

FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London, E. C. F. G. Kretschmer & Co., Frankfort-on-Main, Germany. R. S. Stokvis & Zonen, Rotterdam, Holland. Fenwick Freres & Co., Paris, France. Schuchardt & Schutte, Yokohama, Japan.

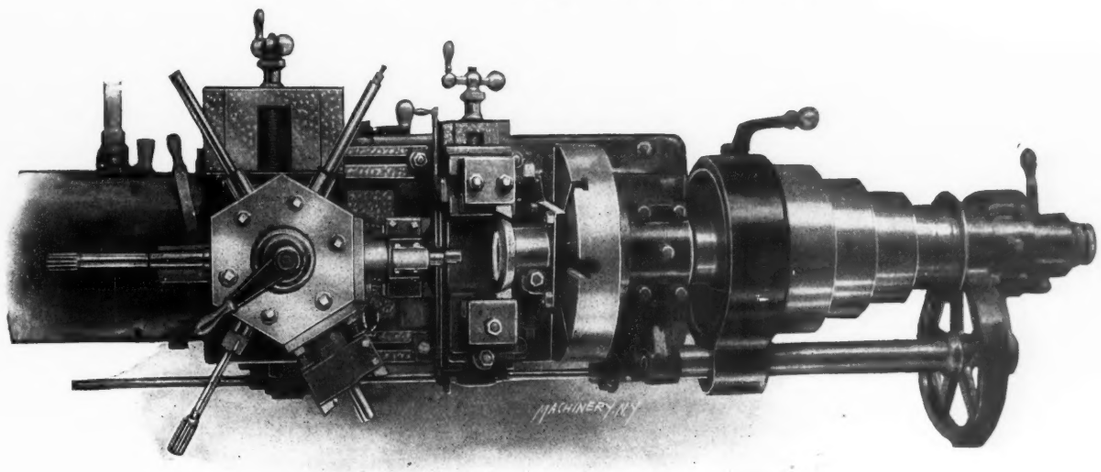
Davis Equipment Will Save You Many Dollars



WORKING DRAWING

15 Minutes Each for these cast iron bevel pinions is something of a record. Consider the big saving effected by doing all such work on one machine—the time saved in setting, labor saved in handling, and the many inaccuracies avoided because re-adjustments are not required.

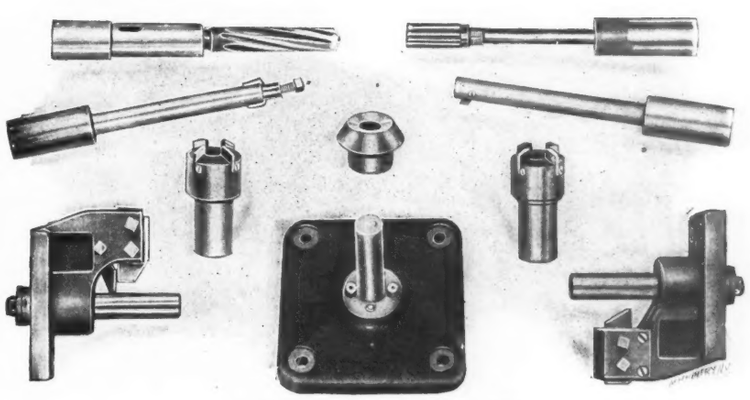
The Davis Turret Boring and Forming Lathe



TOP VIEW OF TURRET SET UP WITH TOOLS FOR FINISHING THE WORK COMPLETELY

Davis Equipment is responsible for the adaptability and wide capacity of these machines. Before you tie your money up in machines of limited capacity, see the "Davis."

Write for catalog today.



TOOLS USED FOR ABOVE WORK

THE W. P. DAVIS MACHINE CO., Rochester, N. Y.

One of every two large Lathes built to-day is a McCabe "TWO-IN-ONE"

More than ever

"the most complete" Lathe—with the new Improvements and famous features that have lately been added. Approved innovations in design and absolute interchangeability of every part and detail in—

A heavy and unusually high powered Triple-geared 48-inch Lathe for the most severe service

2in1

A convenient Back-geared 26-inch Lathe for handy general, all around use

Nothing counts like service—McCabe's "Latest" TWO-in-ONE Lathe covers twice as much capacity as any one ordinary style large Lathe—and the cost is half as much—Get the book of the "2 in-1"

J. J. McCABE

HUDSON TERMINAL, 30 CHURCH STREET NEW YORK CITY

Nicholson Files Make Light Work

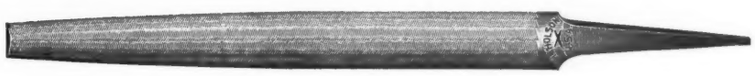
When "many hands" make light work, it is a question of **quantity.**

When Nicholson Files "make light work," it is **quality** that produces the desired result.

Are you depending on quantity or quality? A quantity of "good-enough" files or a few Nicholson "quality" files?

NICHOLSON
U.S.A.

The file that is making "light work" in hundreds of other shops and factories is the file that is needed in your plant to better your product and cut down your expenses. Discard the "good-enough" files and make them **ALL** Nicholsons.



NICHOLSON FILE COMPANY

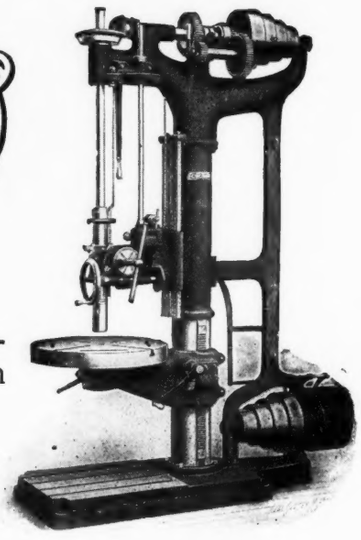
PROVIDENCE, R. I., U. S. A.

Heavy—Powerful—Accurate

THE CINCINNATI

Heavy Pattern Upright Drills

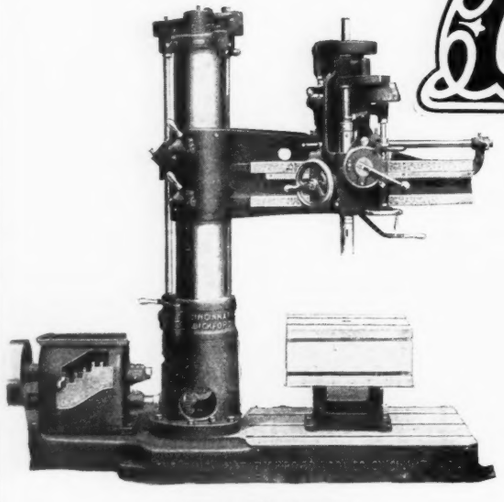
Built on the strongest and most rigid lines, these machines are leaders in accuracy and capacity. Operation is simple and convenient, all levers within easy reach, and the various changes quickly and readily made. Workmanship throughout is the best—spindles, sleeves and shafts finished by grinding, bevel gears planed theoretically correct, patent geared tapping attachment directly on the spindle. Made in all possible combinations, 20″ to 40″ swing, and the greatest producers on the market.



THE CINCINNATI

Heavy Pattern, Sliding Head, Friction Back Gears.

THE CINCINNATI BICKFORD



THE CINCINNATI BICKFORD

Radial Drill, 2½, 3 and 3½ feet.

The latest model in this line and the strongest and most powerful Radial Drill of its swing. The larger driving pulley, greater belt capacity, wide range of feeds, and the convenience of the single lever speed box are distinguishing features that will merit your attention, and we shall be glad to send the full catalogue or special circulars as requested.

The Cincinnati Bickford Tool Co.

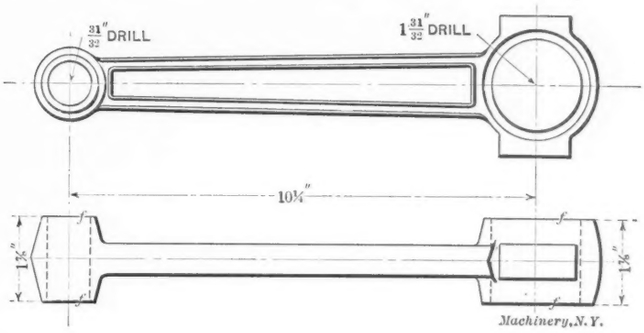
Oakley, Cincinnati, Ohio, U. S. A.

DOMESTIC AGENTS—Prentiss Tool and Supply Co., New York City, Buffalo, Rochester and Syracuse, N. Y., Scranton, Pa. and Boston, Mass.; W. E. Shipley Machinery Co., Philadelphia, Pa.; Brown & Zortman Machinery Co., Pittsburg, Pa.; Motch & Merryweather Machinery Co., Cincinnati and Cleveland, Ohio, and Detroit, Mich.; Marshall & Huschart Machinery Co., Chicago, Ill., Indianapolis, Ind., St. Louis, Mo.; Robinson, Cary & Sands Co., St. Paul and Duluth, Minn.; Hallidie Machinery Co.,Seattle, Wash.; The Hallidie Co., Spokane, Wash.; Zimmerman-Wells-Brown Co., Portland, Ore.; Harron, Rickard & McCone, San Francisco and Los Angeles, Cal.; Gallagher Machinery Co., Salt Lake City, Utah; C. T. Patterson Co., Ltd., New Orleans, La.; The Dewstoe Machine Tool Co., Birmingham, Ala.; Morrison Machinery & Supply Co., Richmond, Va.; J. P. Kemp, Baltimore, Md.

FOREIGN AGENTS—Alfred H. Schutte, Cologne, Paris, Brussels, Milan, Bilbao, Barcelona; Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne, Glasgow; Andrews & George, Yokohama, Japan; Thomas McPherson & Son, Melbourne, Australia; Donauwerk Ernst Krause & Co., Vienna, Budapest.

21½ Minutes Saved on One Operation

If you are interested in Drillology, let us show you how an expert can turn a slow, expensive operation into a profit bearing achievement.

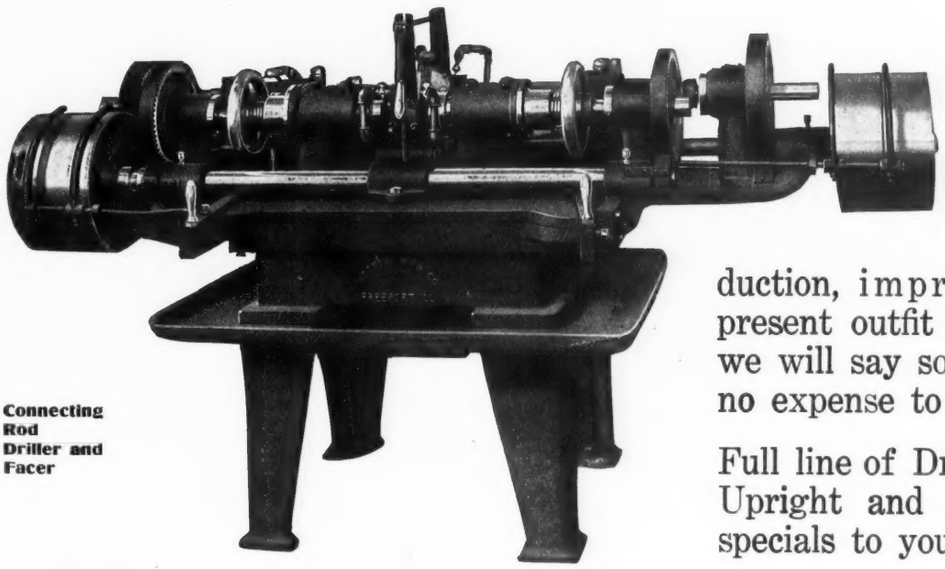


The former time on the connecting rod, shown above, was **26 minutes.** We looked over the proposition, studied it from all sides and were able to cut this time to 4½ minutes for each rod—**21 1-2 minutes saved on every piece.**

Figure this saving by the hour, the day, by the 100 pieces—any way you like—it will still show an amazing reduction on production cost.

Our Connecting Rod Driller and Facer

was the solution of this manufacturer's problem. It is a special machine that is especially successful for its work. We'll tell you all about it if it covers something in your line, otherwise we would rather hear what kind of drilling you have to handle, what materials, the machine now employed and the present output. We have "made good" for the connecting rod man; coined money for others, and are ready for your drilling problem.



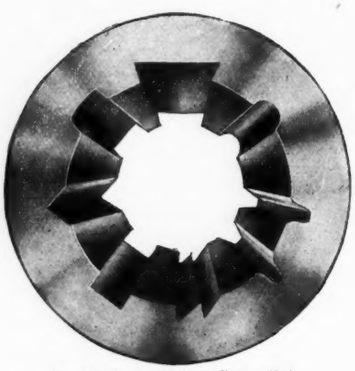
Connecting Rod Driller and Facer

If we can't see the way to save money, increase production, improve on your present outfit in every way, we will say so frankly—and no expense to you.

Full line of Drillers in stock, Upright and Radial styles, specials to your order.

HŒFER MF'G. CO. **FREEPORT, ILL., U.S.A.**

GIANT
TRADE MARK

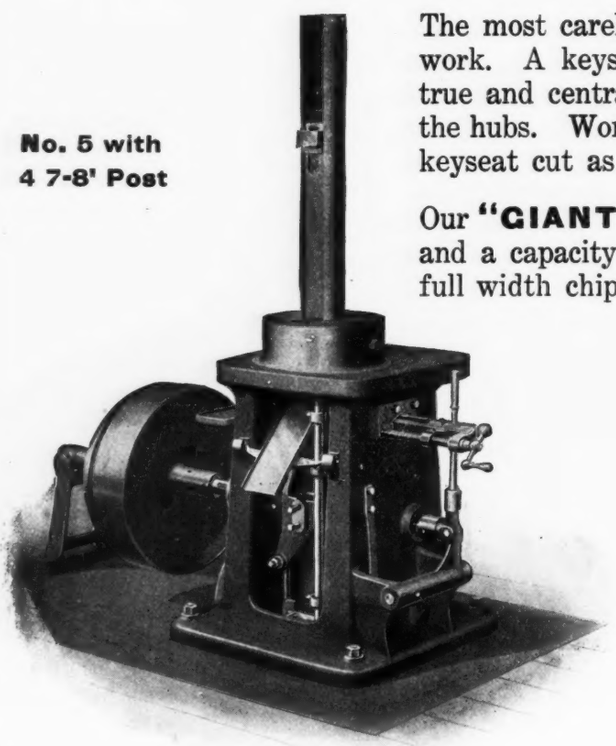


Sample Keyseats in a Taper Hole

GIANT
TRADE MARK

Whether the Hole is Straight or Taper Makes Little Difference to

The GIANT Keyseating Machine



No. 5 with
4 7-8' Post

The most careless workman cannot misplace the work. A keyseat cannot be cut otherwise than true and central, and it is not necessary to face the hubs. Work is chucked by the bore and the keyseat cut as accurately as the work is chucked.

Our **"GIANT"** Keyseater No. 5 has a 25″ stroke and a capacity up to 3½″ in width, cutting heavy, full width chips at each stroke. This machine—made to cut seats in wheels weighing up to 25 tons or more—is supplied with an extra base plate to cover the larger foundation needed to sustain such weights. It also handles the smallest keyseat as well and as quickly as smaller machines.

Our catalogue is full of keyseating information —may we send it?

MITTS & MERRILL

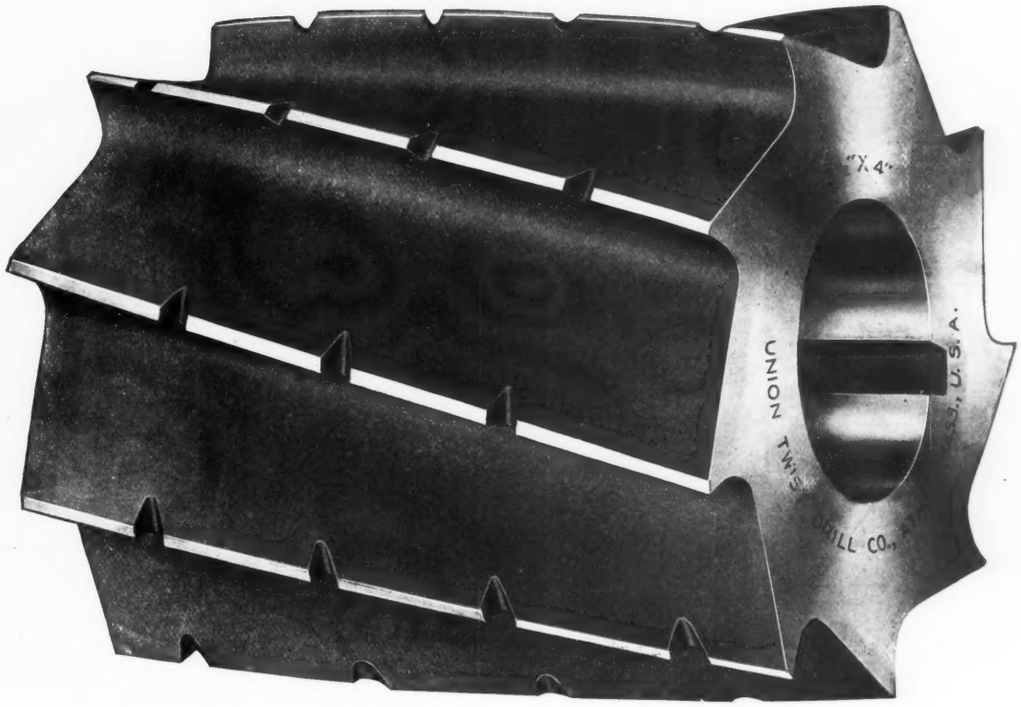
843 Water Street, SAGINAW, MICH., U. S. A.

FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London, England.
Heinrich Dreyer, Berlin, Germany; Austria and Russia.
J. E. Chabert & Co., Paris, France; Belgium and Switzerland.

HIGH SPEED STEEL CUTTERS
With Coarse Teeth for Heavy Milling

This is one of the new type of Cutters recently described in a paper presented to the Society of Mechanical Engineers. Paper read by Mr. De Leeuw of the Cincinnati Milling Machine Company.

A Powerful Cutter For Your Work



MADE AND CARRIED IN STOCK BY

UNION TWIST DRILL COMPANY

"THE CUTTER MAKERS"

ATHOL, MASSACHUSETTS, U. S. A.

STOCKBRIDGE—the SHAPER for SPEED

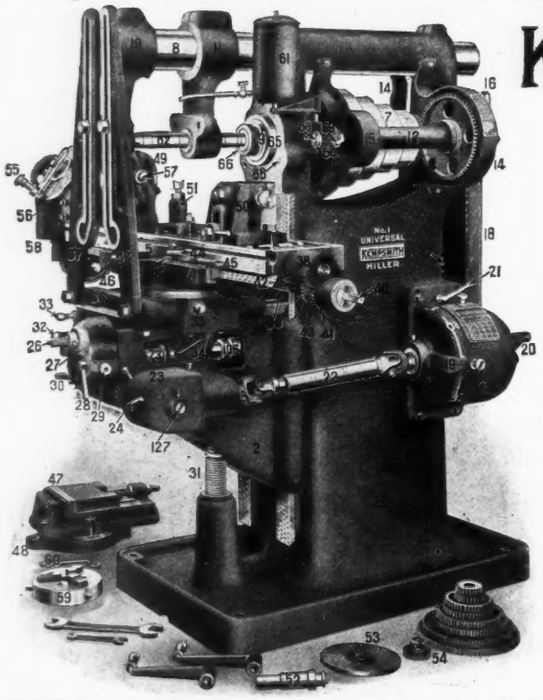
Our Patented Two-Piece-Crank Motion gives to Stockbridge Shapers advantages over any other shaper made. Do not confuse our Shaper with the Regular Crank Shapers. If you do not know the difference find out now, write us for

NEW CATALOG.

NEW YORK CITY OFFICE: Niles-Bement-Pond Co., 111 Broadway.
SAN FRANCISCO OFFICE: Harron, Rickard & McCone, 416 Market St.

Shapers built with care.

Study the convenient, concentrated operation centralized at front of knee, handy to the operator; the absence of confusing, complicated levers and parts. It reveals



KEMPSMITH SIMPLICITY

Here are a few:

32-33—The ONE compound lever at front of knee which trips ANY feed that may be in use.

24—The ONE lever at front of knee which reverses ANY feed that may be in use.

35—The ONE bolt at right front of saddle which clamps the table at ANY angle.

6—The ONE gear box, a self-contained unit providing ALL feed changes.

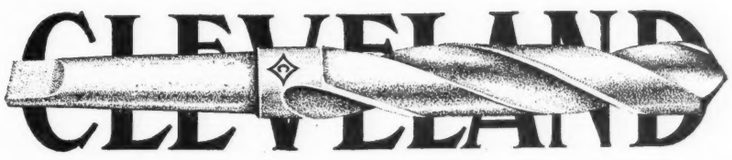
The design throughout is along the same lines.

It is the machine for ready handling.

Built in a wide line, fully described.

THE KEMPSMITH MFG. CO., Milwaukee, Wisconsin

CANADIAN AGENTS—Rudel-Yeates Machinery Co., Montreal.
FOREIGN AGENTS—The Selson Eng'g. Co., London, England. Post Van der Burg & Co., Rotterdam, Holland. A. Engelmann & Co., Liege, Belgium. G. Hartman, Christiania, Norway. Aktiebolaget Goteborgs Maskinaffar, Gothenburg, Sweden. Aktiebolaget Zacco & Co., Stockholm, Sweden. O. R. San Galli, St. Petersburg, Russia. Hanz Schulze, Vienna, Austria. Stussi & Zweifel, Milan, Italy. Schaufelberger & Co., Zurich, Switzerland. Thielicke & Co., Berlin, Germany.



MAKES WORLD'S DRILLING RECORD

At the recent joint Convention of the Railway Master Mechanics and Master Car Builders Associations at Atlantic City, the highest point in drilling efficiency that machine shop practice has ever known was attained by a stock 1¼" Paragon Flatwist High Speed Drill in successfully removing 70.55 cubic inches of cast iron in one minute, repeatedly cutting through a heavy billet at the record-breaking rate of

57½ Inches—Almost 5 Feet—Per Minute

This 1¼" drill ran at 575 revolutions per minute with 1/10 (.100) inch feed per revolution, successfully withstanding the terrific strain of this extreme speed and feed. Before attaining this maximum performanee, which was approached gradually, numerous other "Cleveland" Drills were put through at the rates of 33, 35 and 47½ inches per minute. In no case was the limit of strength of the drills reached, but the speed of 57½ inches per minute could not be exceeded on account of the inadequate capacity of the electric feed wires which brought current to the motor driving the drill press.

Facsimile of the bulletin which gave the first detailed announcement of the results to the numerous interested spectators.

There can be but One Logical Conclusion That Will Interest the User of Drills—"Cleveland" Materials—"Cleveland" Workmanship—"Cleveland" Heat Treatment—**Must Be Right.**

Although drilling at such a speed is not to be recommended as economical shop practice, and can only be accomplished under ideal conditions, such as—absolute rigidity in the machine, uniform and sufficient driving power, solid clamping of the work, perfect grinding of the tool, and the most expert handling—yet this extremely severe test proves conclusively the unequaled durability and reserve efficiency of "Cleveland" Twist Drills.

A practical test of "Cleveland" Drills, under your own shop conditions, will involve no obligations and may mean a valuable increase in drilling efficiency for you.

The CLEVELAND Twist Drill Co.

New York CLEVELAND, OHIO Chicago

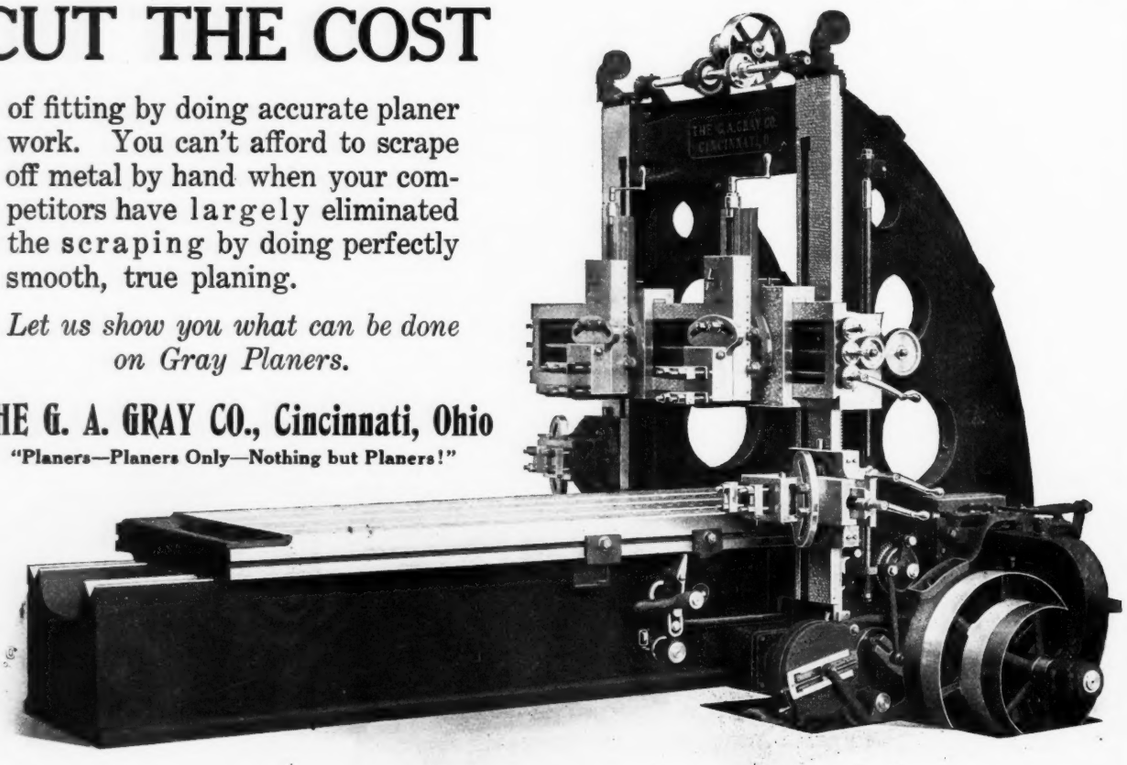
CUT THE COST

of fitting by doing accurate planer work. You can't afford to scrape off metal by hand when your competitors have largely eliminated the scraping by doing perfectly smooth, true planing.

Let us show you what can be done on Gray Planers.

THE G. A. GRAY CO., Cincinnati, Ohio

"Planers—Planers Only—Nothing but Planers!"



A few reasons why you need the Knecht Variable Speed Planers.

They cut more linear feet per minute by running faster in each direction and reversing more promptly at each end.

They remove more metal per each foot of run.

They secure an accurate surface in less chips.

They do the same amount of work in fewer strokes, thus economizing power. Reversing and returning represent wasted energy.

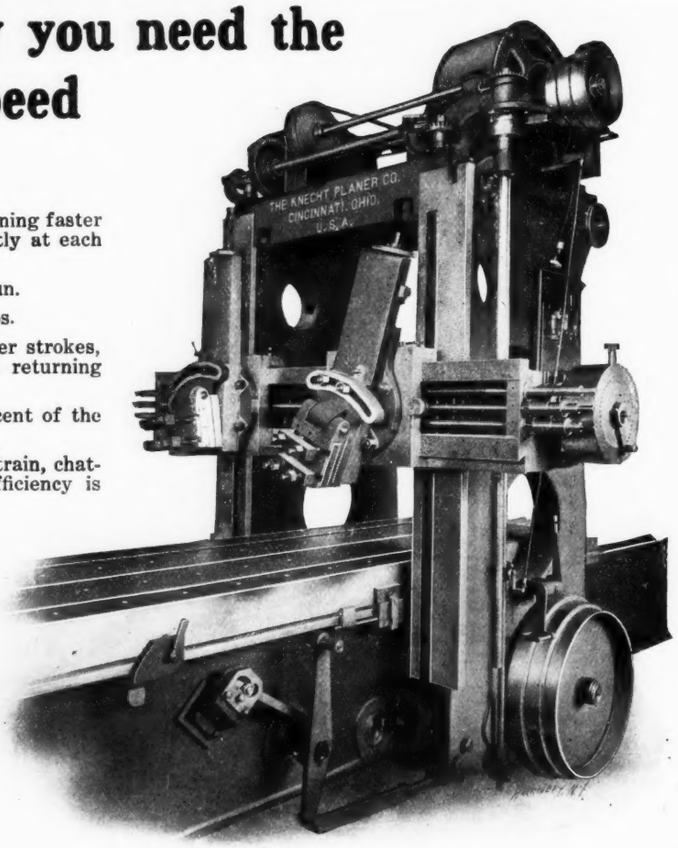
They deliver at the tool point a larger per cent of the belt power.

By massive construction and accurate gear train, chattering is eliminated, and an increased efficiency is secured with high speed steel.

Every adjustment is instantly made without the necessity of stopping the planer. This not only saves time, but insures the best operating conditions on all classes of work.

They can be operated more hours per year. No planer requires so few repairs, and has so few breakdowns.

For further reasons why you need this Planer, send request for literature today.

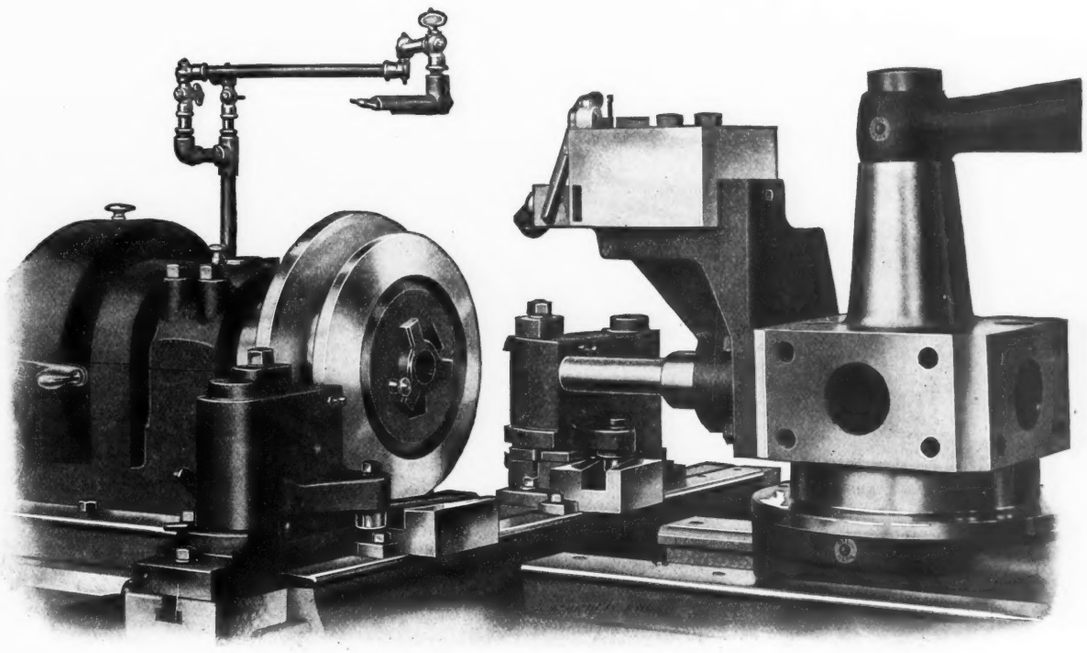


The Knecht Planer Co.

CINCINNATI, OHIO, U. S. A.

Automatic Machine Tools
FOR
Maximum Efficiency Shops

All Cutting Operations Automatically Performed
One Attendant Operates in Groups of Two to Six Machines



POTTER & JOHNSTON METHOD of Automatically Machining Bevel Drive Gear, face and back angles. Single point tools, roughing and finishing, used throughout.

ACCURACY and ECONOMY GUARANTEED

All Turret Lathe Work is Good Work for the

Potter & Johnston Manufacturing Automatics

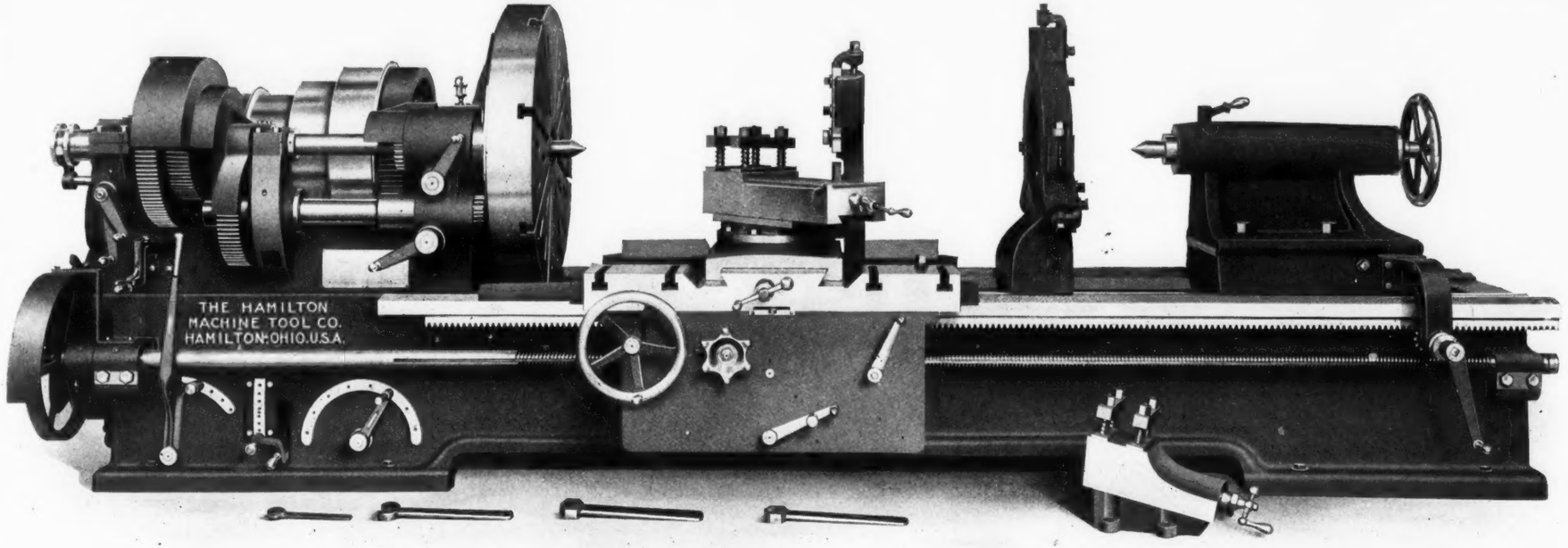
CATALOG?

POTTER & JOHNSTON, PAWTUCKET, R. I., U. S. A.

OFFICES AND REPRESENTATIVES: Office for Great Britain and France: 78 Avenue de la Grande Armee, Paris, J. Ryan, Manager. New York Office: Fulton Bldg., 50 Church St., Walter H. Foster, Manager. Detroit Office: Modern Machinery and Engineering Co., 1514 Ford Bldg. Milwaukee Office: Berlin Bldg., 19th and National Aves., Chas. H. Shaw, Manager.

FOREIGN AGENTS—Chas. Churchill & Co., Ltd., London, Birmingham, Manchester and Newcastle-on-Tyne, England, and Glasgow, Scotland. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Barcelona, Bilbao. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg, Copenhagen, Budapest.

THE NEW HEAVY PATTERN HAMILTON LATHE

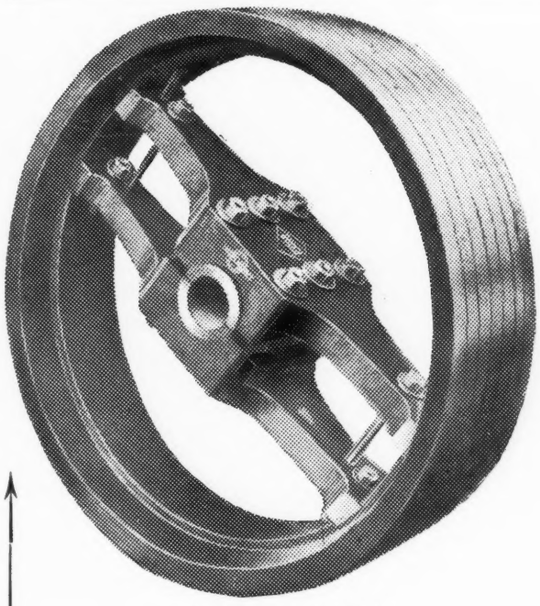


Our Latest Model 42-inch Quadruple-Geared Machine is much heavier than the earlier models. We have added weight to carriage bridge, tailstock, etc. Bed is wider. The drive is powerful and ample for any job within the range of the machine. Quick change gear mechanism and other time saving features make for speed. For hard service and good service—try this lathe.

Special circular mailed on request.

The Hamilton Machine Tool Company, Hamilton, O.

LATHES **PLANERS** **SHAPERS** **UPRIGHT DRILLS**



"OLD RELIABLE"

DODGE

Twenty-Eight Years In Service

TWENTY-EIGHT years ago marked the birth of the Wood Split Pulley with interchangeable bushings. It was the **parent** wheel—the beginning of the Dodge Idea of **Standardization** and **Interchangeability.** The Idea that stands for greatest modern improvement in power transmission and distribution. Over three million Dodge "INDEPENDENCE" Wood Split Pulleys are in operation, with sales **increasing** every day.

The Dodge Wood Split Pulley is widely imitated. But factory owners appreciate its distinctive merit of design, its high grade materials and workmanship and perfect balance, its case hardened face that will wear the edge of diamond-pointed tools. Being split, it can be moved from place to place. Its separable wood bushings adapt it to a wide range of shaft diameters. The usefulness of a Dodge Split Pulley is never done.

Send for our new booklet, "Dawn of the Dodge Idea," which gives an interesting lot of history and still more interesting power transmission facts. We should be pleased to correspond with dealers on the Dodge line. It's a splendid stock carrying proposition.

DODGE MANUFACTURING CO.

General Office and Works: MISHAWAKA, INDIANA

New York Cor. Cedar and Wash'n. Sts.		**Minneapolis** 202-204 Third St., S.	
Boston 137-139 Purchase St.	**St. Louis** 507 N. Main St.	**Pittsburgh** 337 Second Ave.	**Cincinnati** 126-128 W. Third St.
Brooklyn 37th St. and 2d Ave.	**Chicago** 208-214 S. Clinton St.	**Philadelphia** 815 Arch Street.	**Atlanta** 54-60 Marietta St.

Agencies in other leading cities throughout the country.

COUPON

DODGE MFG. CO., Mishawaka, Indiana.

I am interested in Wood Split Pulleys. Send me your literature on the subject.

Name .....

Firm .....

Position .....

Address .....

Machinery, 8–11

REAR AXLE WORM AND GEAR DRIVES

¶ Rear axle worm and worm gear drives produced on our machines, under calibrated test, transmitted over 90% of the power applied.

¶ The life of this drive is practically indefinite and we offer to any one desiring this ultimate drive assured success.

¶ Remember our machines cut the worm as well as the gear and do it rapidly and accurately.

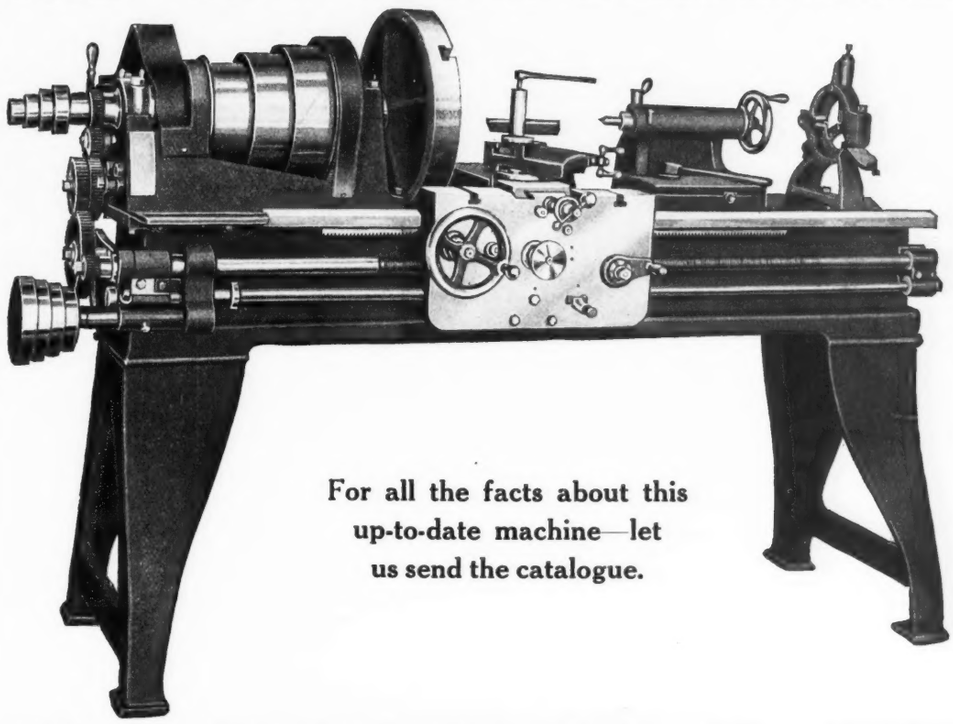
The

LEES-BRADNER COMPANY

CLEVELAND, OHIO, U. S. A.

FOR THE BUSINESS BUILDING MACHINIST

THE VON WYCK 15-INCH ENGINE LATHE

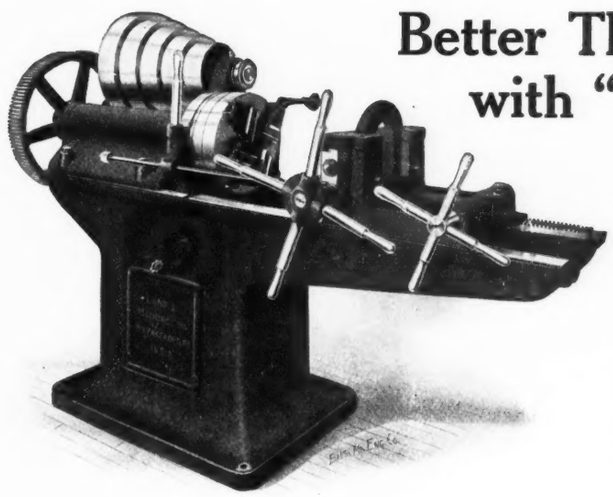


For all the facts about this up-to-date machine—let us send the catalogue.

meets requirements in accuracy, reduction capacity, equipment, convenience and rapid operation.

VON WYCK LATHES are thoroughly well built and are sold at a price made possible only by concentrating in one size machine and manufacturing in large lots.

VON WYCK MACHINE TOOL CO., Cincinnati, Ohio



Better Threads—Fewer Cuts with "Landis" Bolt Cutters

A prominent manufacturing company in Erie, Pennsylvania, writes:

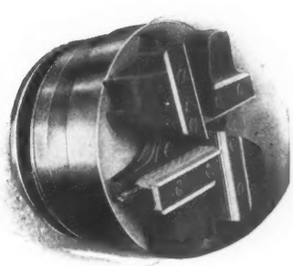
"We are getting **better threads with one cut** in your machine than we previously obtained with **two** cuts on our old cutters."

We have scores of similar letters (many of them much stronger), covering every phase of bolt cutting and answering every possible question with enthusiastic endorsements and convincing statements of results obtained with "Landis" Bolt Cutters and

"Landis" Improved Dies

These testimonials **prove** our claims that "Landis" Dies wear **twenty times as long as hobbed dies,** besides requiring no hobbing, retempering or annealing.

CATALOGUE?

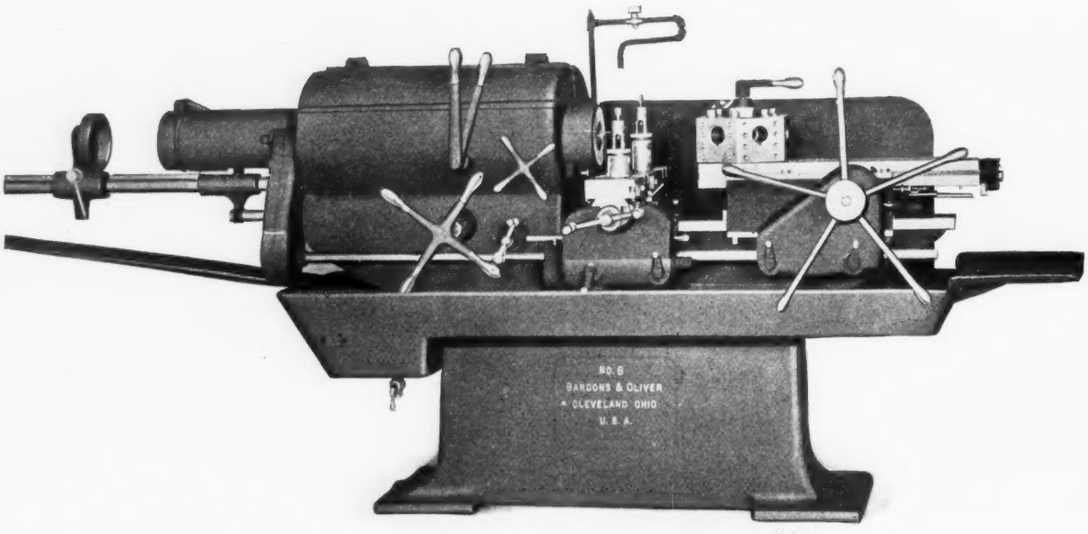


Landis Machine Company, Waynesboro, Pa.

THE WALTER H. FOSTER COMPANY, 50 Church Street, New York.

Marshall & Huschart Machinery Co., Sole Agents for Chicago, St. Louis and Indianapolis. Dewstoe Machine Tool Co., Sole Agents, Birmingham, Ala. Manning, Maxwell & Moore, San Francisco, Cal. A. R. Williams Machinery Co., Toronto, Canada. Williams & Wilson, Montreal, Canada. Schuchardt & Schutte, Exclusive Representatives at London, Berlin, Shanghai, Vienna, Stockholm, Tokyo, Budapest, Copenhagen and St. Petersburg. D. Drury & Co., Johannesburg, South Africa. Benson Bros., Melbourne, Australia.

Bardons & Oliver Geared-Head Motor Driven Lathe

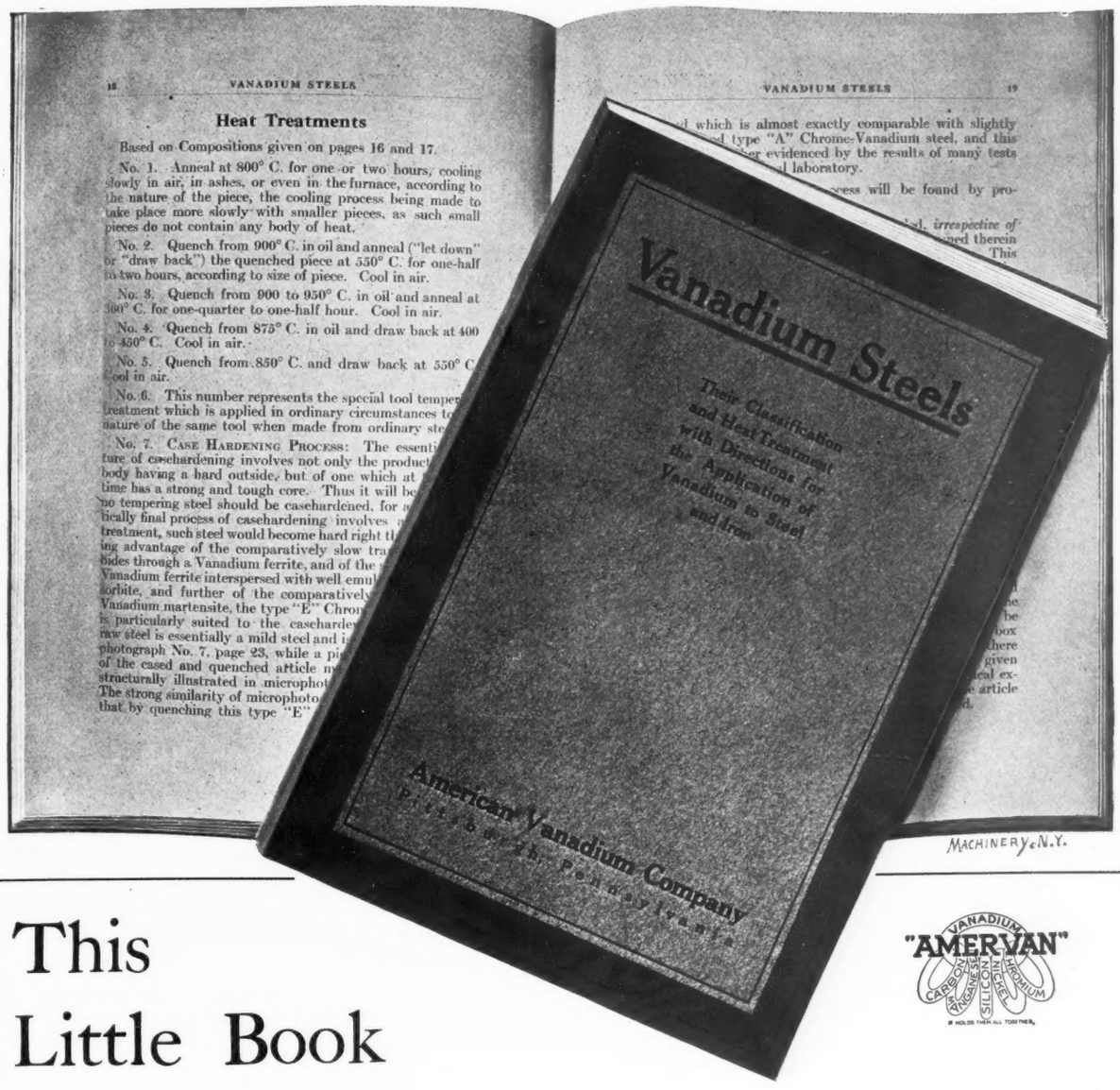


Motor Drive for Bardons & Oliver Machines

is the latest improvement in this improved line of Turret Lathes. The Geared-Head Machine shown is the regular No. 8 size, with automatic chuck, wire feed, power feed to the turret slide and power cross feed to cut-off slide, and automatic throw-out for both feeds. The motor gives a speed variation of three to one, which with the two mechanically obtained spindle speeds, controlled by one of the two vertical levers, make the total speed range about ten to one. One great advantage of our new geared-head design, especially for high speed work, is the method of reversing the spindle. The reverse gear, mounted on the spindle, is engaged by a friction clutch operated by the other of the two vertical levers mentioned above, and the spindle is thus the only member of the driving train that is reversed, all the other parts continuing to run in the same direction for forward or reverse movements of the spindle.

This machine, in common with all B. & O. Lathes, has all revolving parts carefully guarded, and convenient and easy control has been made a special feature. Complete catalogue "M" or special data on request.

Bardons & Oliver, Cleveland, O., U.S.A.


VANADIUM STEELS
Heat Treatments
Based on Compositions given on pages 16 and 17.
No. 1. Anneal at 800° C. for one or two hours, cooling
No. 2. Quench from 900° C. in oil and anneal ("let down"
No. 3. Quench from 900 to 950° C. in oil and anneal at
No. 4. Quench from 875° C. in oil and draw back at 400
No. 5. Quench from 850° C. and draw back at 550° C
No. 6. This number represents the special tool temper
No. 7. Case Hardening Process: The essenti
VANADIUM STEELS
Vanadium Steels
Their Classification and Heat Treatment with Directions for the Application of Vanadium to Steel and Iron
American Vanadium Company
Pittsburgh, Pennsylvania
MACHINERY, N.Y.

This Little Book

on the subject of Vanadium Steels, will help you out on a lot of the questions that come up in everyday work.

The information is of the condensed, boiled-down description that takes you to the point without unnecessary circumlocution.

Tells how to get the best steel, the best castings, for any special use.

Covers the important question of Heat Treatment for Steel thoroughly and in the clearest language.

Gives tests, standard facts and tells just what type of Vanadium Steel is best adapted for any purpose.

We have published this book for the benefit of all steel users and will send a copy **free**, to any address.

Fill in the Coupon and mail today.

American Vanadium Company

Miners of Vanadium Ores
Largest Producers of Vanadium Alloys in the World

325 Frick Building, PITTSBURGH, PENNA., U. S. A.

"AMERVAN"

COUPON

American Vanadium Company.
Send me copy of your booklet Vanadium Steels, as offered in MACHINERY, August issue.

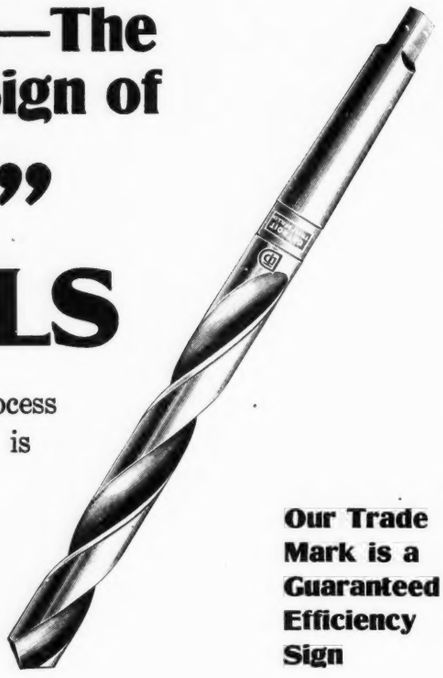
Name.....

Address.....

Firm.....

A Mark with a Meaning—The Guaranteed Efficiency Sign of

"DETROIT" TWIST DRILLS



Our Trade Mark is a Guaranteed Efficiency Sign

Every user of drills should know that every process in the manufacture of every "Detroit" Drill is in the hands of skilled workmen.

The work of every operator is supervised by "specialists" who have acquired an almost supernatural instinct for accuracy. The result is absolute standards in size and uniform cutting quality.

Every "Detroit" Twist Drill runs perfectly true from tip to shank, removes the greatest possible amount of metal at every turn and does the greatest possible amount of work without regrinding.

TRADE MARK

To this scientific exactness in manufacture is added the highest quality raw material. Every piece of steel used in "Detroit" Drills is selected on account of its special fitness for its special use. Frequent chemical analyses further safeguard your interest in the quality of our product.

As Dependable a DRILL as the Market Affords

Our methods of tempering are the best a scientific age affords and our equipment assures you of the highest possible results.

Do the drills you are now using embody all these points of excellence?

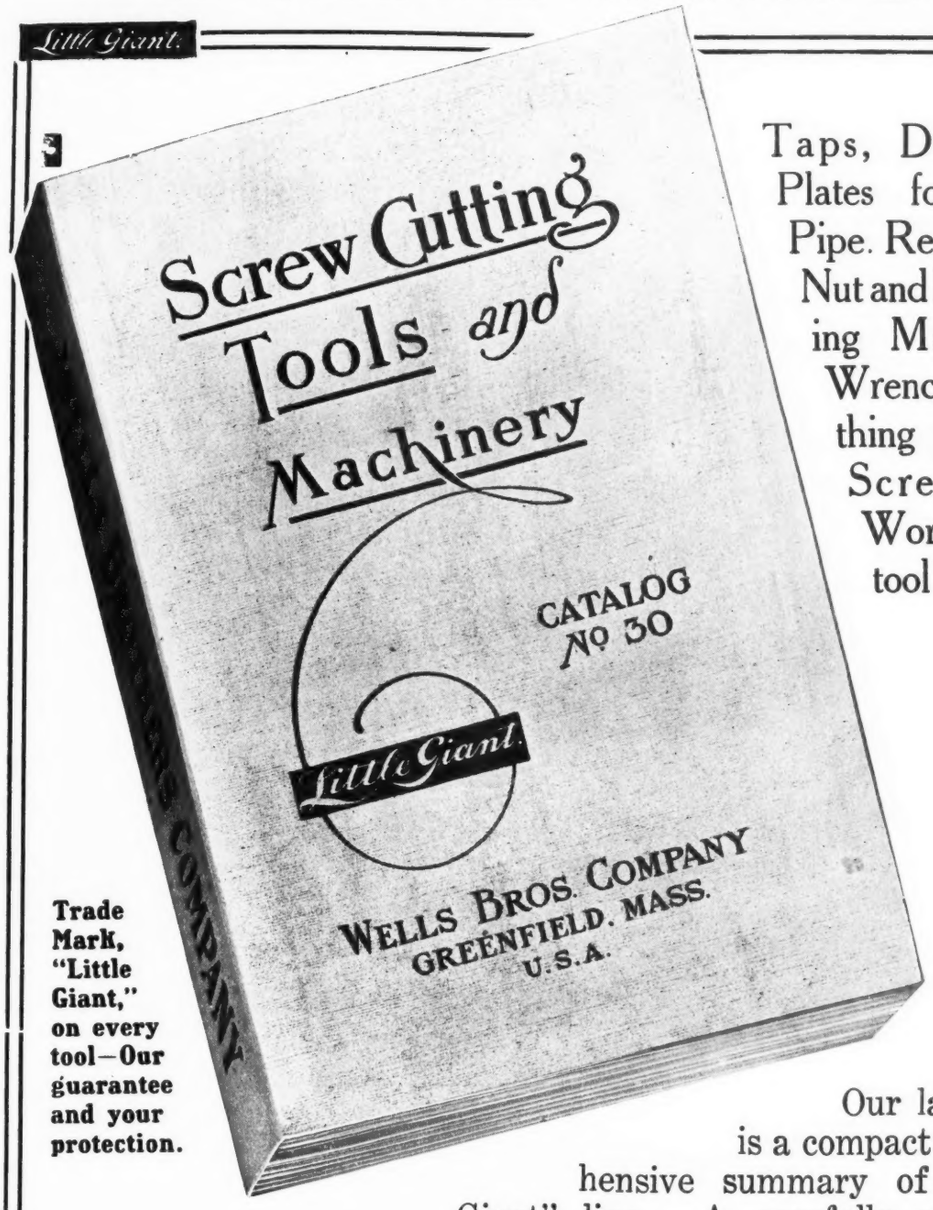
¶ **OUR trade-mark is YOUR guarantee. Write for Catalog "F."**

Detroit Twist Drill Company

600-612 Fort Street, W. **Detroit, Mich.**

The Latest in Screw Cutting Tools is Shown in this Book

Little Giant. Little Giant.



Taps, Dies—Screw Plates for Bolt and Pipe. Reamers—Bolt, Nut and Pipe Threading Machinery—Wrenches—Everything you need for Screw Cutting Work, and every tool guaranteed

Trade Mark, "Little Giant," on every tool—Our guarantee and your protection.

Our latest Catalog is a compact but comprehensive summary of the "Little Giant" line. A carefully arranged and indexed catalog and price list, convenient in size, showing all standard styles and sizes, with full data for ordering, it includes a great deal of information that is not otherwise readily obtainable. It's one of the helps in the day's work that costs you nothing, but pays interest. Write for a copy today, and keep it handy.

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WELLS BROTHERS COMPANY

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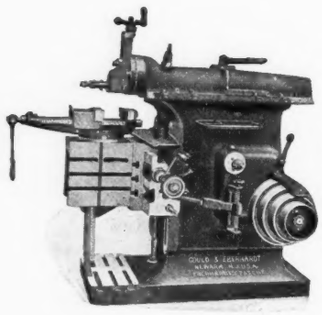
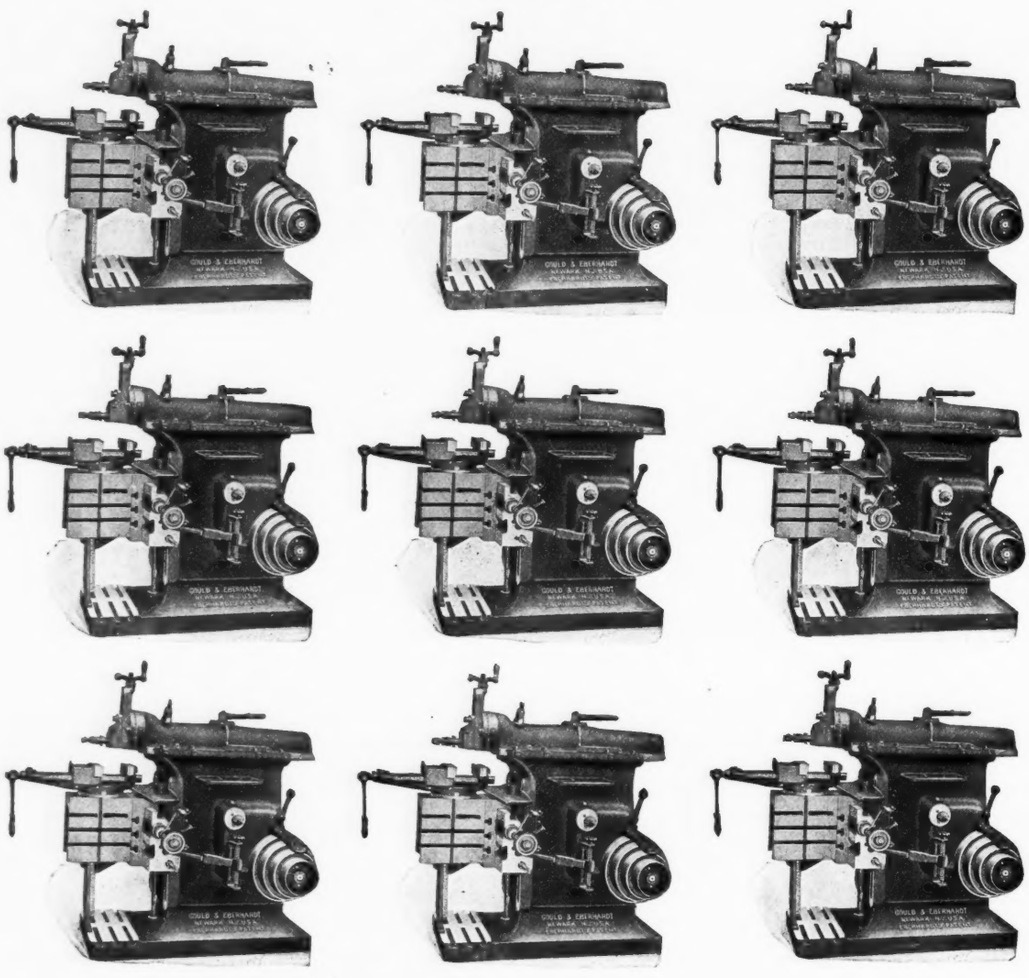
ONE manufacturer just placed his order for **ten** Shapers; the agent receiving same placed orders for 23 of our Shapers within two weeks.



IS not the confidence shown convincing evidence of the merits and true value of G & E "High Duty" Shapers?



A WELL SEASONED SHAPER IS A PAYING INVESTMENT
LET US TELL YOU MORE

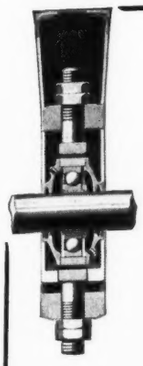
GOULD & EBERHARDT

"HIGH DUTY" SHAPERS
AUTOMATIC GEAR AND RACK CUTTING MACHINERY

ESTABLISHED 1833 NEWARK, N.J. U.S.A.

DOMESTIC AGENTS: Prentiss Tool & Supply Co., New York, Boston, Buffalo, Syracuse, Rochester and Scranton. Marshall & Huschart Mchy. Co., Chicago, Indianapolis, St. Louis and Milwaukee. Motch & Merryweather Mchy. Co., Cleveland, Pittsburgh, Detroit and Cincinnati. W. E. Shipley Mchy. Co., Philadelphia. J. P. Kemp, Baltimore. H. Ellis, Jr., Richmond. Henshaw, Bulkley & Co., San Francisco, Oakland and Los Angeles. Hallidie Mchy. Co., Seattle. Hallidie Co., Spokane. Portland Mchy. Co., Portland, Ore. Dewstoe Machine Tool Co., Birmingham, Ala. Robinson, Cary and Sands Co., St. Paul and Duluth, Minn.

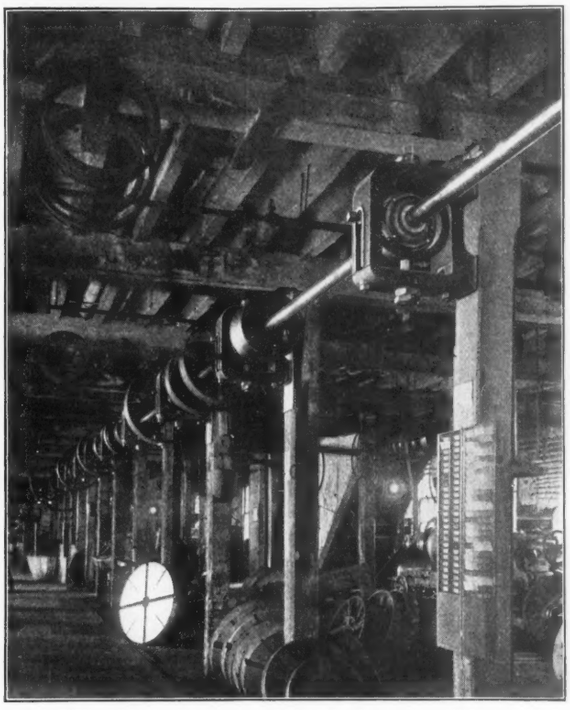
FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London, Eng. R. S. Stokvis & Zonen, Ltd., Brussels and Rotterdam. Heinrich Dreyer, Berlin.



How Much Power

does it take to run your shafting?

With electric motors the answer is easy. Even with a steam engine and belt drive it is well worth while to get an indicator and find out, for with that system of transmission the losses are always heavy.



Hess-Bright Hangers in Machine Shop of Union Mfg. Company, New Britain, Conn.

Power costs money. Is it logical to pay for economical, highly efficient machines, and bring the power to them through shafting that wastes probably, a quarter to a half of it on the way?

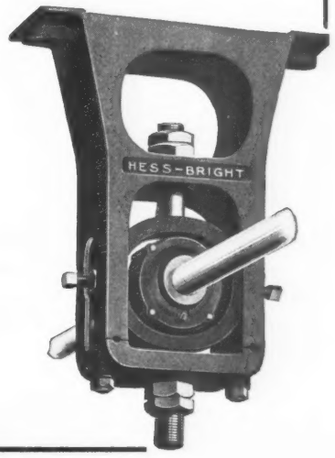
Like paying for expensive water works and using leaky pipes, isn't it?

HESS-BRIGHT BALL BEARING HANGERS

are the most frictionless carriers ever devised for line shafting. They contain the same Hess-Bright Ball Bearings that have become famous in automobiles, electrical machinery, machine tools and all uses where power must be saved or wear prevented.

Hess-Bright Hangers are not a makeshift: they are expressly designed to suit the best ball bearings made. Though high in first cost, they are by far the most economical in the end.

Our Hanger Booklet gives further information.



THE HESS-BRIGHT MANUFACTURING CO.

2111 Fairmount Avenue, Philadelphia, Pa.

DIAMOND
High Speed Drills

Will put your factory drilling department on an ECONOMY BASIS that will soon show on YOUR COST SHEETS.

The Consumer of drills naturally has his factory difficulties to solve. He must select those drills that will accomplish QUALITY RESULTS for his products, at a cost that will give him a profit.

We have made CAREFUL, SCIENTIFIC and MECHANICAL STUDY of these problems. Consequently, we can tell you wherein your trouble may be overcome by using the right kind of drills of the correct temper and character of steel.

We make drills for all classes of work HERE IS WHERE WE CAN MEET ON A PROFITABLE BASIS. Suppose you write us about those conditions and difficulties WE WILL ADVISE you as would your Physician, your Attorney or your Banker, and place at your command the fund of results accumulated for years in our scientific testing department.

WE HAVE BATTLED with your problems for many years and Solved Them. You may be assured our advice will save you money. If the drills you are now using have that "W & B DIAMOND" TRADE MARK ON THE SHANK, YOU ARE RIGHT.

Write for Catalogue 74 D.

TRADE W B CO MARK

Tools of Quality Bear these Marks

TRADE W&B MARK

The Whitman & Barnes Manufacturing Co.

Established 1854

AKRON, O., U. S A.

NEW YORK STORE: 64 READE STREET

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EUROPEAN REPRESENTATIVE—Theodore Butler, Ltd., 149 Queen Victoria Street, London, Eng.

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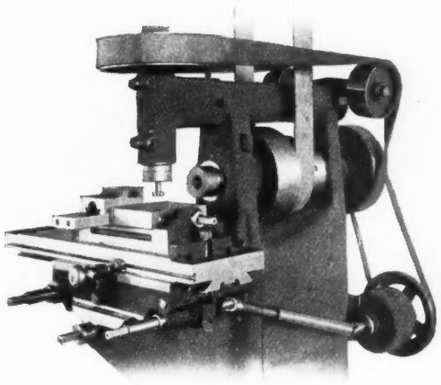
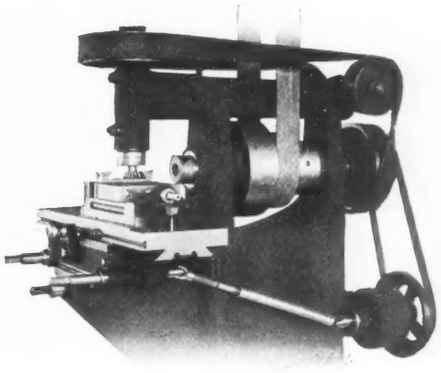


THE engraving shows a cutter milling a T-slot in a lathe tool rest. A good idea of the general arrangement of the belting, the way in which the power is transmitted to the vertical spindle, may be had from the illustration.

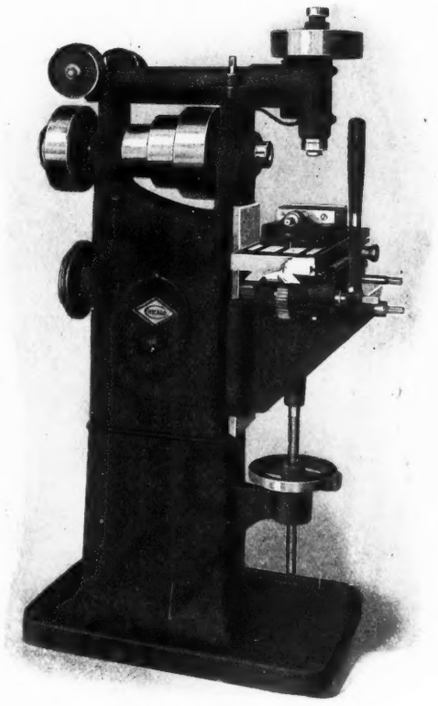


IN the illustration is shown the vertical spindle in operation, angular milling the stop gauge for thread cutting on a lathe. This vertical spindle is among the important features of the Small Milling Machine, making it particularly adapted to brass workers and manufacturers of small parts.

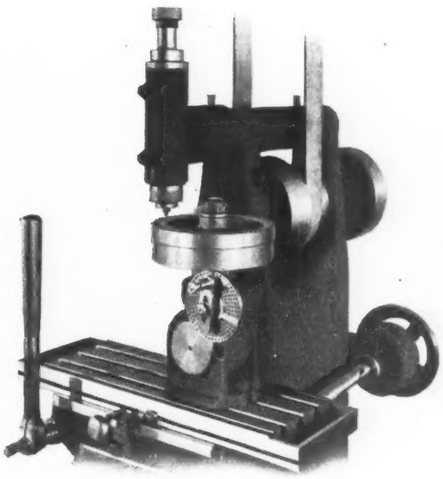
A Few Vertical Spindle Operations

on the

Chicago Small Milling Machines



No. 38-A Machine
Net Price, as shown above, including Overhanging Arm and Arbor, $350.00.



THE Small Milling Machine is particularly adapted for making micrometer graduations on hand wheels, graduated collets, etc. The lever movement to the table allows the operator to move the table with one hand, and the hand index with the other. The fly cutter used for this work may either be fastened between the collars on the arbor or with a split collet in the vertical spindle.

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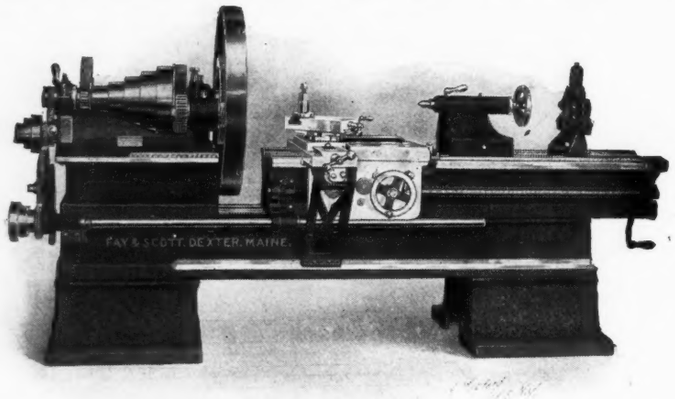


Eight Foot Centers
on an eight foot bed

Thirty-two in. Swing
on a sixteen inch lathe

all for a little more than the price of a small lathe, and at *half the price* of a large lathe.

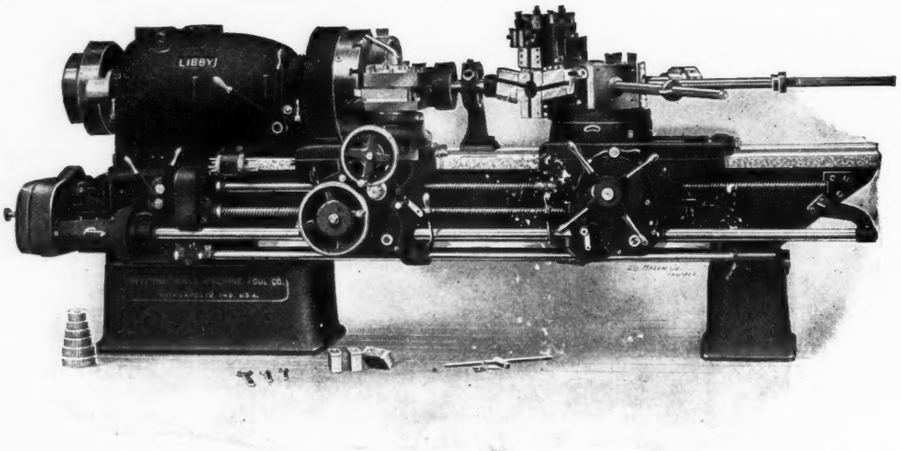
16-32 x 8 EXTENSION GAP ENGINE LATHE

For large work the top bed is moved by power, out along the base, opening the gap, making a large swing lathe with increased center distance. The overhanging carriage is supported by a bracket with adjustable gib, making a rigid design capable of turning full-swing diameters to the best possible advantage. The triple geared face plate furnishes ample driving power.

Seven sizes of these we build, and all as good.
The new book is yours for the asking.

FAY & SCOTT, DEXTER, MAINE, U. S. A.

"The Machine Tool Hog"



"LIBBY" TURRET LATHES HANDLE CUTTING TOOLS IN GANGS—TAKE EXTRA HEAVY CUTS—SAVE TIME AND MONEY

We build the "Libby" Full Swing Side Carriage Turret Lathe to give the maximum of output in both quantity and quality at a minimum of expense. Operate two tools on the same piece of work at the same time, and it will be finished in about half the usual time. Double or triple or quadruple the size of the tools, and the time saving will be correspondingly less. The only limit to the capacity of the "Libby" is the nature of the work and the capability of the tools.

Catalog mailed on request.

THE INTERNATIONAL MACHINE TOOL CO., Indianapolis, Ind., U.S.A.

"WELD THE WINFIELD WAY"

WHY BUY

a cheap Electric Welding Machine?

WHY NOT BUY

the best made?

WINFIELD No. 306 ELECTRIC SPOT WELDER
Over-hang 6 inches

THE WINFIELD ELECTRIC WELDING MACHINE COMPANY

for the benefit of their hundreds of purchasers and prospective purchasers of Electric Welding Machines wish to announce that they own and control all of their own patents and patents pending on Spot and all other style Welders made by them and that infringers will be vigorously prosecuted.

For further assurance of good faith to purchasers of our machines, we will furnish upon request indemnifying bonds protecting them from any loss or damage through claim of infringement.

The "WINFIELD WAY" of point welding was originated by us as we were the first to build and install machines to spot weld without having to stamp projections in material. We most certainly would not continue making this line if we thought it infringed on any other patent and, if there is any controversy with our competitors, we shall be very glad to have the matter decided just as quickly as possible by the courts.

We make the most complete line of hand lever, combination hand and foot treadle, foot treadle, portable and power spot Welders of any concern in the world. We do not make cheap priced machines but furnish high grade goods at reasonable prices. DO NOT BE DECEIVED BY IMITATORS.

100% of the Welders already sold by us are still in use and additional orders are coming in continually from present users. What better recommendation can we present? Investigate thoroughly before you purchase. Write us for information. Send us samples of your work to weld.

JOB WELDING A SPECIALTY

THE WINFIELD ELECTRIC WELDING MACHINE CO.

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Every Machine Tool Builder and User
Should Read These Bulletins

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HYATT STANDARD BUSHINGS
"COMMERCIAL TYPE"
JUNE, 1911
THE HYATT STANDARD BUSHING
WITH ONE SPLIT LINER
THE distinctive feature of the Hyatt Roller Bearing is the rollet, which
is made from a strip of steel wound into a coil or spring of uniform
diameter. The advantage of a roller of this construction is its flexi-
bility, which at all times enables it to present a bearing along its entire
length, resulting in a uniform distribution of load on the bearing surface
surfaces on which and in which it operates. All tendency to distortion of the
bearing itself or of the parts in which it operates is entirely eliminated, as
the rollers will adjust themselves to any irregularities that may be present.
There is no necessity for hardening the various parts of the bearing, and any
soft steel surface satisfactorily meets all requirements. It may also be oper-
from its construction that the rollers act as oil reservoirs and, being spiral,
they perform the function as oil carriers, thereby insuring perfect lubrication
of all parts at all times.

Brimful of useful facts and figures
We will gladly mail them on request

HYATT ROLLER BEARING CO.
NEWARK, NEW JERSEY

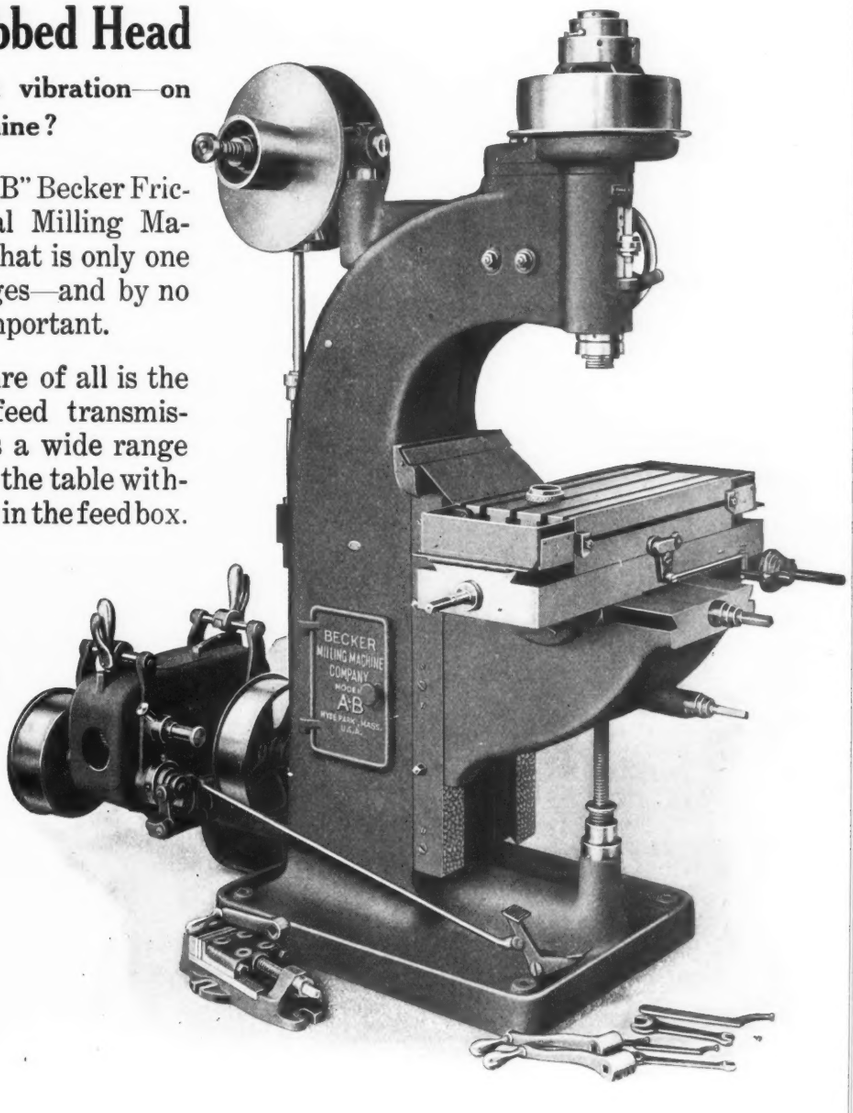
75-2112

Have You a Gibbed Head

with its attendant vibration—on your milling machine?

The New Model "A B" Becker Friction Feed Vertical Milling Machine has none. That is only one of many advantages—and by no means the most important.

The greatest feature of all is the variable friction feed transmission, which brings a wide range of feeds directly to the table without the use of gears in the feed box.



Model "A B" Becker Friction Feed Vertical Miller Combines High Efficiency, Great Power and Extreme Durability

It furnishes all the power of the gear driven machines without their inherent troubles. Back-lash is impossible and a steady, powerful motion can always be depended on. Five changes of spindle speeds. A new method of gibbing and locking the knee in place secures absolute rigidity.

Any rate of speed from .003 to .075" per revolution of the cutter instantly obtainable on the Model "A B" without back gears; .003 to .250 on the back-geared Model "A B". This line of machines made in several sizes.

Our Special Circular is illuminating.
Write for it.

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HYDE PARK, MASS., U. S. A.

AGENTS—Niles-Bement-Pond Co., New York. Selson Engineering Co., Ltd., London, England. Schuchardt& Schutte, Berlin, Germany; Vienna, Austria; Stockholm, Sweden; St. Petersburg, Russia; Copenhagen, Denmark; Budapest, Hungary; Shanghai, China; Tokio, Japan.

Do Your Figuring Now

It is hot, but therein lies your opportunity. Business has beaten a retreat before the fierce heat of the dog-day sun, and you are left with no trouble but your own. So hie you away to the shade of a spreading elm, by the side of a babbling brook. Take with you nought save your pencil and paper, your common sense, and your store of practical experience. Then go to it.

Perhaps it is new equipment you are figuring on—or a new department—or a new shop; and you will need gear cutting machinery. Then, you are anxious to start right. It will save time, expense and worry if, from the very beginning, you adopt the system of gear cutting which will give you continuous satisfaction, year in and year out.

Here is a solemn and sincere statement. The **Gear Shaper Cutter** and the **Gear Shaper Process** represent today the highest pitch of attainment in gear cutting; the methods followed in making the cutter and producing the work are the most refined, the most scientific.

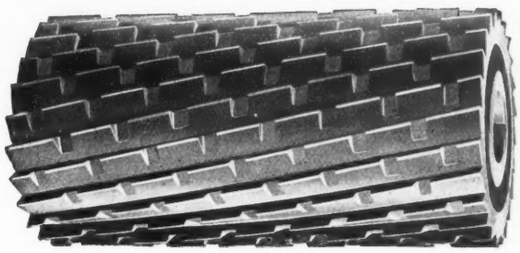
We have faith in the above statement. And we have faith that you will subscribe to it after adequate study and comparison.

Where is your particular spreading elm and babbling brook? Send us the address and we will send you material for study and comparison. Or—if you have no elm and brook—come to Springfield, Vermont, and we will lend them to you. And you can study the Gear Shaper at first hand. Our shop is open to you.

The Fellows Gear Shaper Company

25 Pearl Street **Springfield, Vermont, U. S. A.**

FOREIGN AGENTS—Henry Kelley & Co., Manchester, Eng. M. Koyemann, Dusseldorf, Germany. Ph. Bonvillain and E. Ronceray, Paris, France. White, Child & Beney, Vienna, Austria. Adler & Eisenschitz, Milan, Italy. The C. & J. W. Gardner Co., St. Petersburg, Russia.



THE KEY TO PROFITABLE MILLING

If you've invested a lot of money in milling machines, you naturally expect substantial profits.

But remember that your machines earn **maximum** profits only when running to their **full productive capacity.**

How can you make them attain and maintain full productive capacity? By providing them with cutters of proved efficiency

"SHIELD BRAND" CUTTERS

TRADE STANDARD TOOL CO. MARK

"Shield Brand" Cutters are made of High Speed and Carbon Steel which has successfully passed through exhaustive tests.

They are correctly designed to do their work with the least possible strain on the machines—plenty of chip room between teeth.

We make them in all styles—for all purposes. If you can furnish work enough for your machines, we can furnish cutters that will enable them to turn out the greatest amount of high grade work possible to machines of their class. Let us co-operate.

Send for Catalog No. 18.

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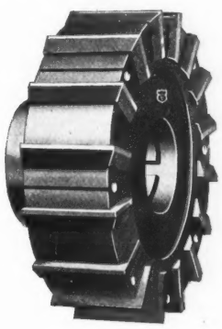

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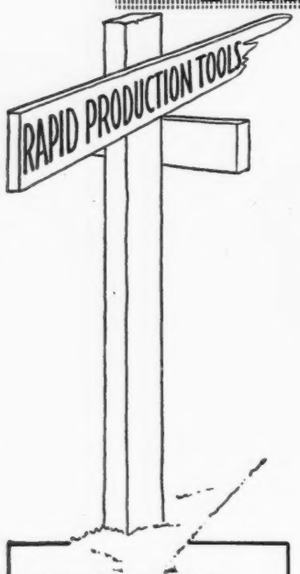

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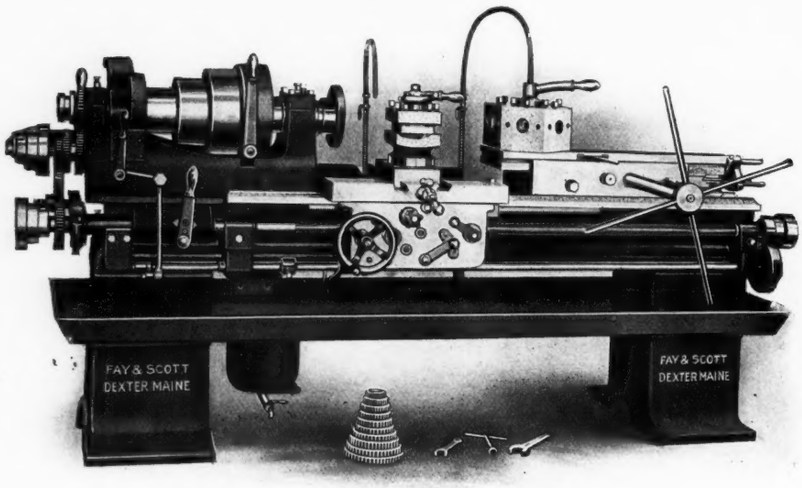

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As they say in the bookstalls, is the

Fay & Scott 20-inch Improved Universal Turret Lathe

The popularity of this machine is founded on the most practical of reasons—it does the work for which it is designed with greater economy, in less time, and with closer accuracy than it could be accomplished by any other method.

Embracing all the advantages of other turret machines, it is still without their greatest disadvantage—it is not a special purpose machine. You may use it in every way that an ordinary engine lathe is used, it being fitted with regular carriage and screw-cutting attachment, but when it comes to producing duplicate pieces from bar stock or castings, the 20" Universal will revolutionize your lathe department.

Price, specifications and full description furnished by

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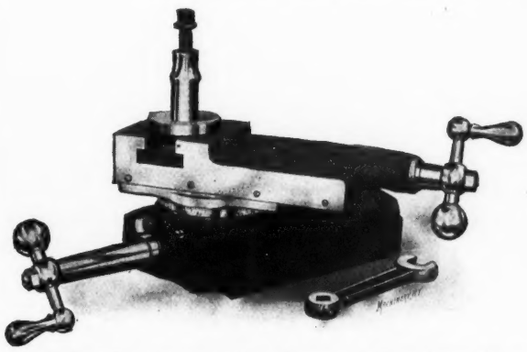
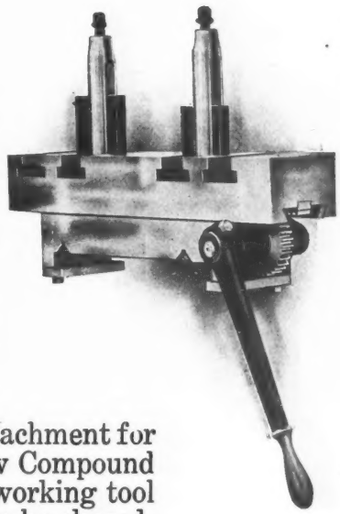
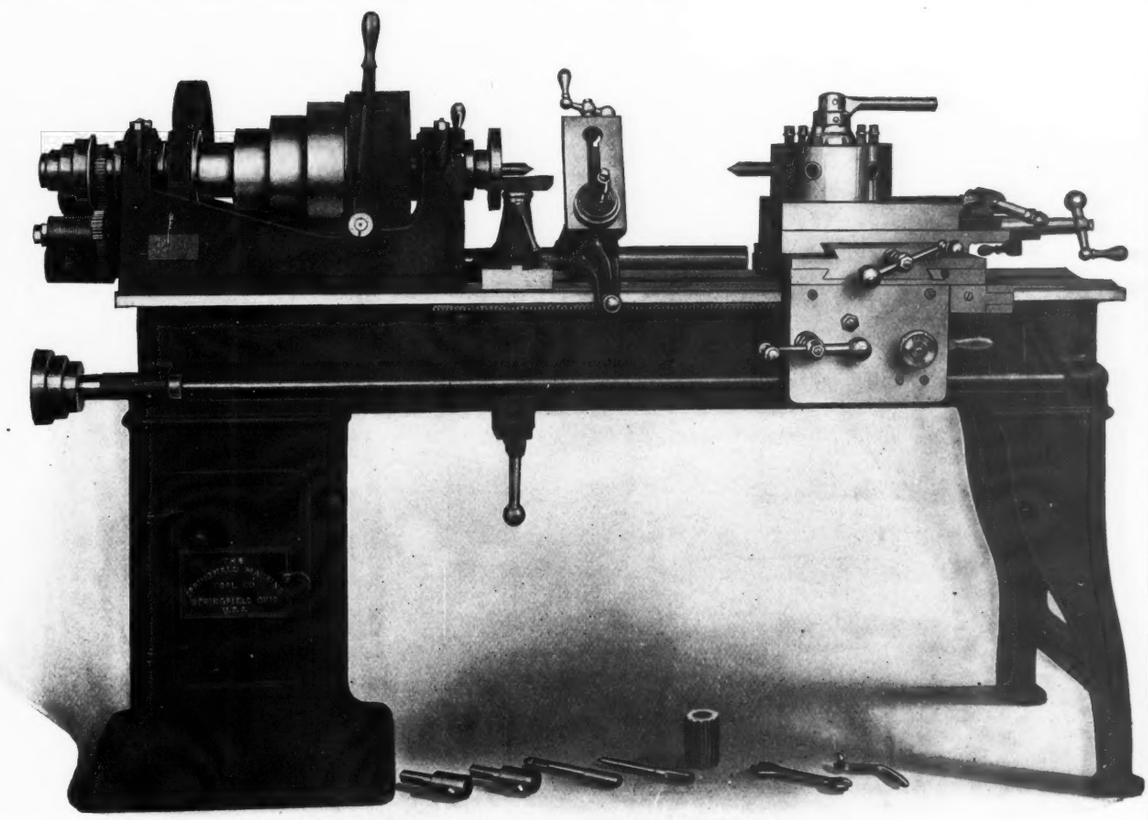
Improved Cabinet Lathe
"A Brass-Work Special"





For high grade design, complete equipment, operating convenience and general efficiency you can't beat "Springfield" Tools. The 18-in. Cabinet Lathe is a case in point. It has friction head, power longitudinal feed, taper attachment for turning tapers, as well as attachment for threading tapers, and in addition can be furnished with new Compound Rest and Cut-off Rest, making it the most complete brass working tool on the market. With proper hob and leader any thread can be chased, right or left hand, without removing a gear. The Compound Rest is used for turning small bevel gears and other work, and the Cut-off Rest for turning, forming and finishing with Cut-off tools. *Special Circular No. 105 gives further points.*



THE SPRINGFIELD MACHINE TOOL CO.

631 Southern Ave. SPRINGFIELD, OHIO, U. S. A.

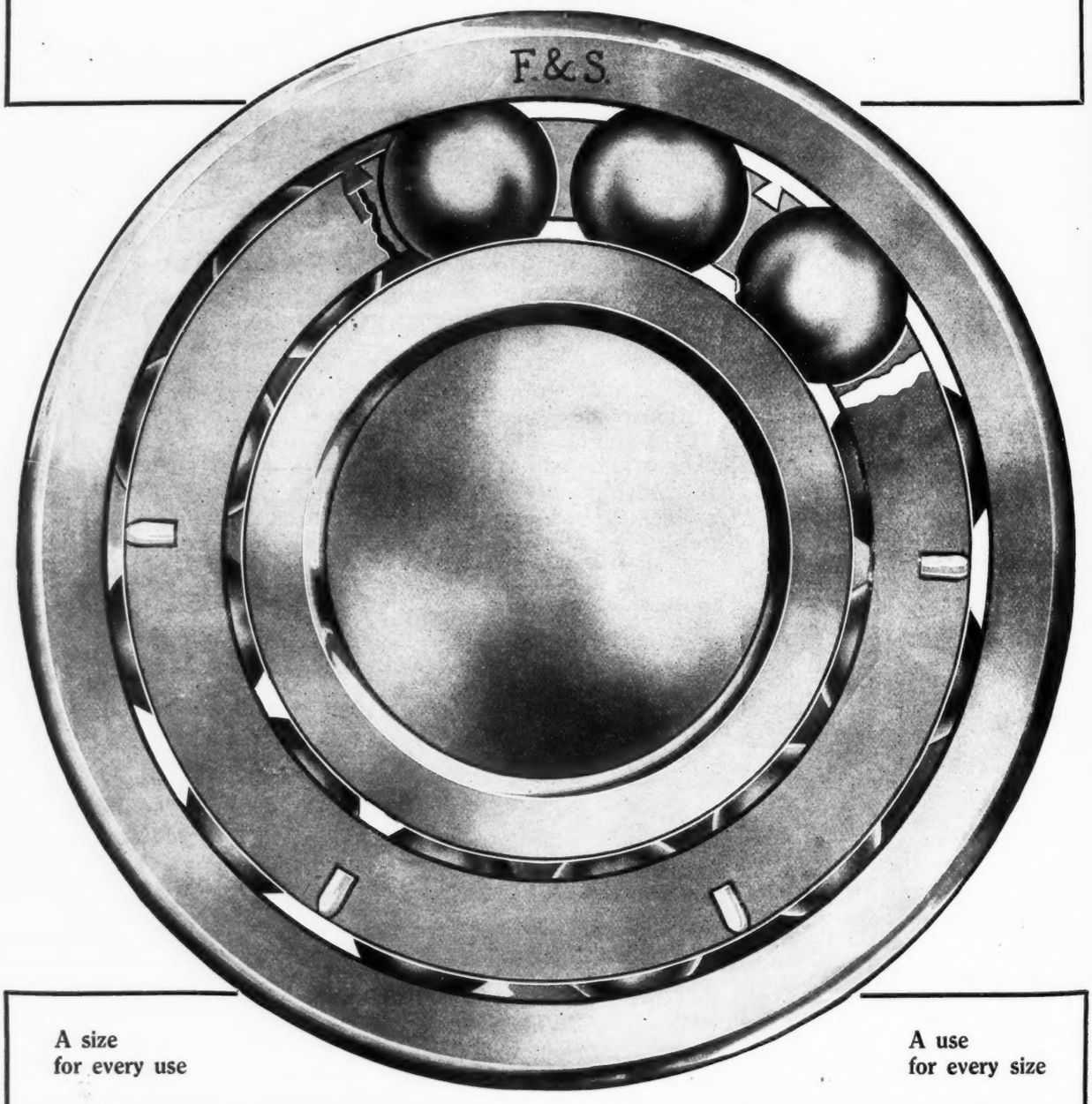
Agents for Germany, Ludw. Loewe & Co., Berlin. Agents for Italy, Stussi & Zweifel, Milan.
The E. L. Essley Machinery Co., Agents for Chicago, Ill. Geo. E. Neil, Cleveland, Ohio.

The Dependable Kind—

F & S Annular Ball Bearings

(Made in Germany)

Efficiency in Ball Bearings carried to its highest point



A size for every use

A use for every size

¶ Fichtel & Sachs annular ball bearings are designed to carry out in practice the principle that a correctly built ball bearing distributes the load between all the balls in a position to receive it.

¶ Heretofore commercial and mechanical limitations of accuracy have led to ball bearings being so designed that only one or two balls would be loaded at any instant.

¶ F & S annular ball bearings are made in standard ball bearing sizes, interchangeable with other makes. They differ from others, in having a higher load carrying capacity and greater endurance, due to the larger number of balls contained in the bearing.

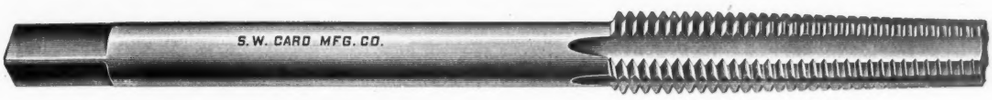
¶ F & S annular ball bearings have their races filled with balls—yet the construction is such that the destructive wear on the balls in the "full type" bearing is eliminated. The balls travel on a continuous unbroken path—and for this reason, where other makes of bearings have proved inadequate to the service imposed, F & S annular ball bearings have frequently been substituted with satisfactory results.

¶ RESULT—for equal loads F & S annular ball bearings are the most durable in the world. For equal size F & S annular ball bearings have the greatest load capacity.

J. S. Bretz Company, *Sole Importers,* 250 West 54th St., New York

"THE WINNING CARD"

Screw cutting tools with the well-known Card stamp of quality have won, and continue to occupy, the highest rank in their important field.



CARD SCREW CUTTING TOOLS

come as near perfection as the best of present designers can conceive, and the most skillful workmanship can produce from the highest grade materials. If you want the most uniform, longest wearing and best tempered tools on the market, get Card tools. They come in all standard styles and are **absolutely guaranteed.**

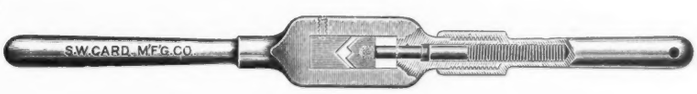
Card Taps

are the embodiment of **Quality, Uniformity, Durability and Efficiency**—truest in size and the most accurate in pitch.

Card Dies, Screw Plates, Etc.

are recognized everywhere as the last word on the subject. They have new features which put them far in the lead and should be familiar to every responsible man in the machinery field.

The New Card Catalogue has a message for you—send for it today.



S. W. CARD MANUFACTURING COMPANY

MANSFIELD, MASS., U. S. A.

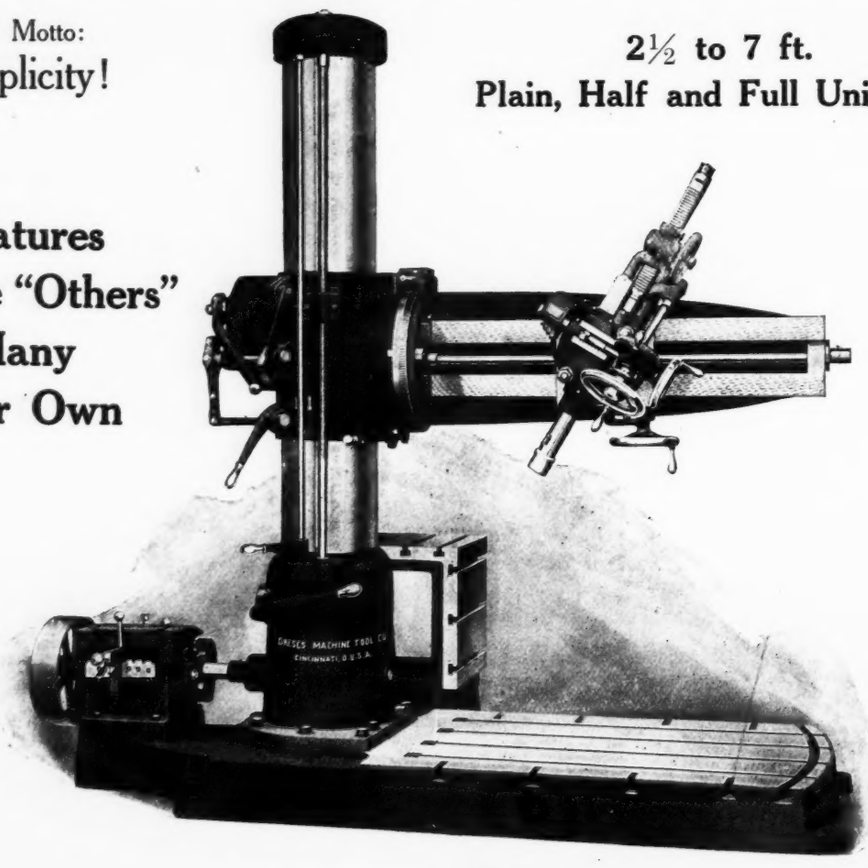
EUROPEAN AGENTS—Chas. Churchill & Co., London, Birmingham, Manchester and Glasgow; Markt & Co.,Ltd., Paris; Fenwick Freres & Co., Turin; Ignacz Szekely, Budapest; V. Lowener, Stockholm, Copenhagen, Christiania; A. A. Kamfraath (Brussels), Ltd., Brussels; Hans Schulze, Vienna and Brunn, Austria; Andrews & George, Yokohama, Tokio, Osaka; J. Lambercier & Co., Geneva.

RADIAL DRILLS

Our Motto:
Simplicity!

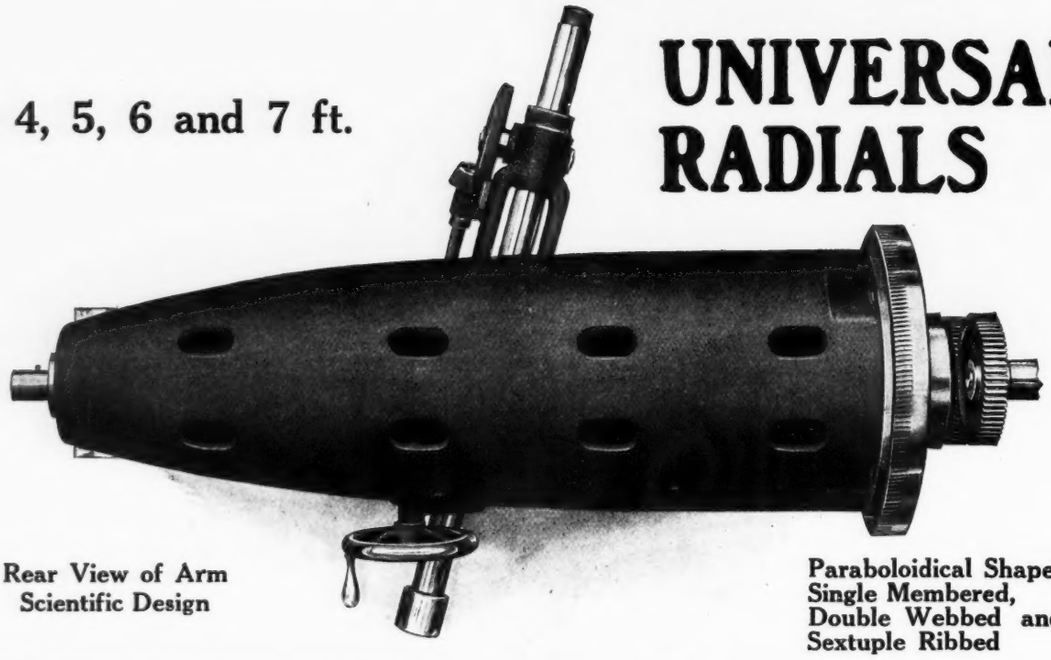
2½ to 7 ft.
Plain, Half and Full Universal

All Features
Of The "Others"
And Many
Of Our Own



4, 5, 6 and 7 ft.

UNIVERSAL RADIALS



Rear View of Arm
Scientific Design

Paraboloidical Shape,
Single Membered,
Double Webbed and
Sextuple Ribbed

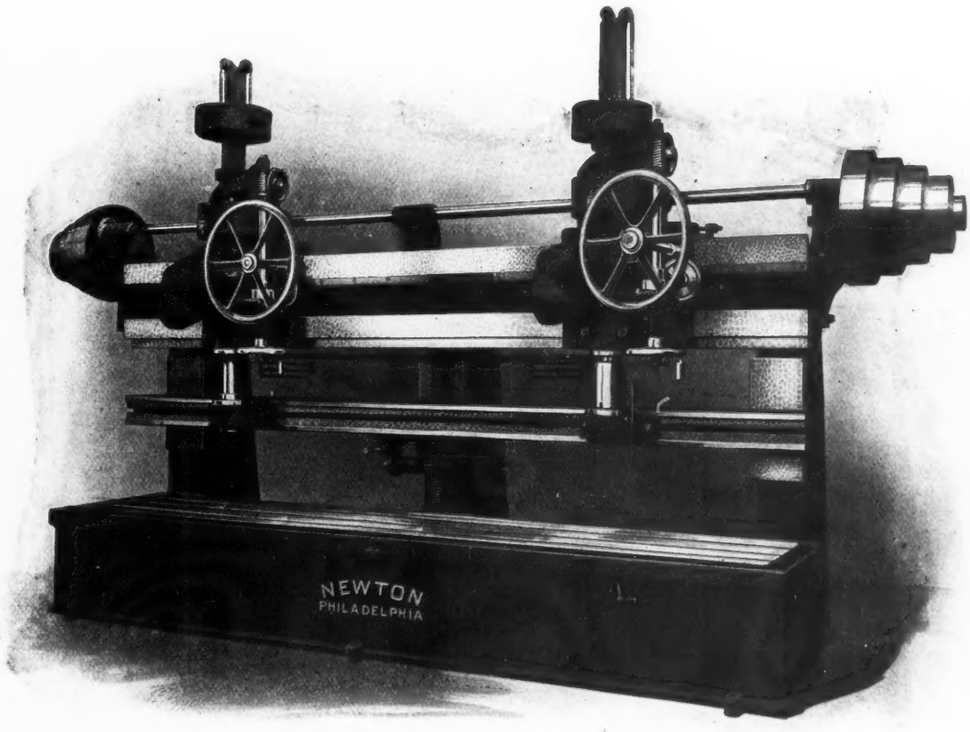
DRESES MACHINE TOOL COMPANY, Cincinnati, Ohio, U.S.A.

AGENTS—Manning, Maxwell & Moore, Inc., New York, Boston, Philadelphia, Cleveland, Chicago, Detroit, Atlanta, Mexico City and Yokohama; Carey Machinery & Supply Co., Baltimore; Baird Machinery Co., Pittsburg; Wm. C. Johnson & Sons Machinery Co., St. Louis; Mine & Smelter Supply Co., Denver and Salt Lake City; Pacific Tool and Supply Co., San Francisco; Schuchardt & Schutte, Berlin, Vienna, Prague and Budapest; Moscow Machine Tool Co., Moscow; Wilh. Sonesson & Co., Malmo and Stockholm; Van Rietschoten & Houwens, Rotterdam; V. Lowener, Copenhagen and Christiania; Stussi & Zweifel, Milan; Alfred Herbert (France), Ltd., Paris, Belgium, Spain and Portugal; Shewan Tomes & Co., Shanghai, Pekin and Canton; Castle Bros., Wolf & Sons, Manila.

NEWTON

(REGISTERED TRADE MARK)

Fixed and Portable Boring, Drilling and Milling Machines
Rail Drilling, Ending and Sawing Machines
Portable Screw Driven Slotting Machines
I-Bar and Chord Boring Machines
Cold Metal Sawing Machines
Rotary Planing Machines
Crank Slotting Machines
Bolt Threading Machines



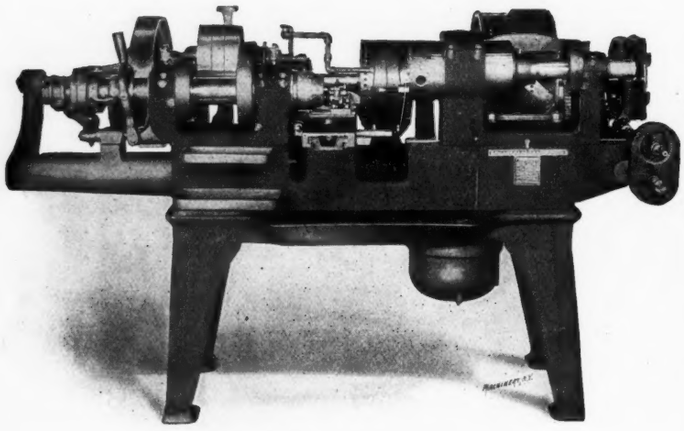
DUPLEX ROD BORING MACHINES

By the use of Newton Rod Boring Machines, with special guide bearing, production is increased by heavier feeds and elimination of pilot hole.

Newton Machine Tool Works, Inc.
Philadelphia, U. S. A.

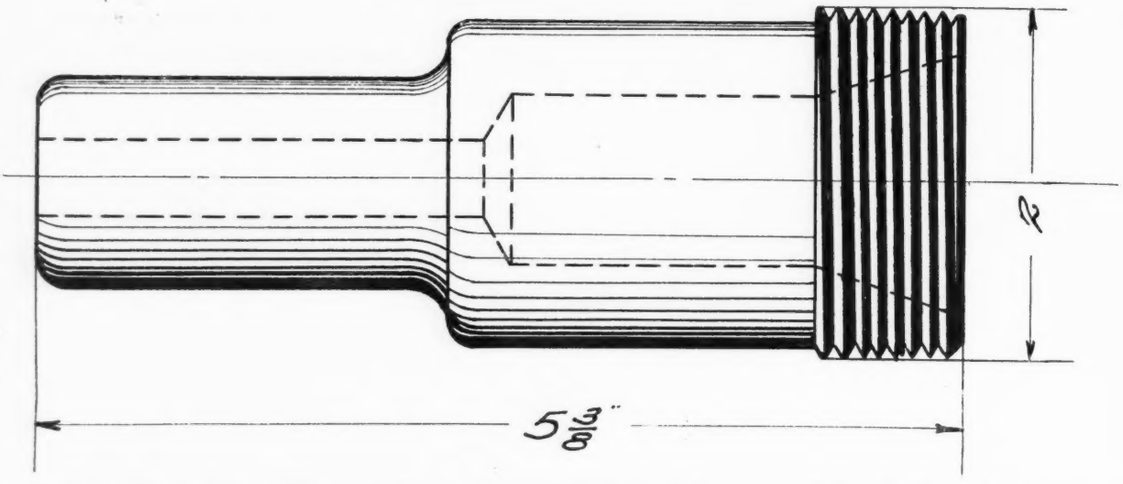
FOREIGN REPRESENTATIVES—Berlin, Heinrich Dreyer. Vienna, Rudolf Salzer. Italy, Spain, Switzerland, Belgium and France: Fenwick Freres & Co., Paris, France. Japan: Manning, Maxwell & Moore, Yokohama. Canada: Williams & Wilson, Montreal.

Thousands of "Cleveland" Automatics are in use today



Because in efficiency, convenience, adaptability and durability, these machines come first. They are the simplest automatics built, therefore the easiest to operate and keep in order. They have less parts than any others, all parts are interchangeable, all working parts within easy reach of the operator. The turret is extremely rigid and remains in perfect alignment after years of service. Change from one job to another is easily and quickly accomplished—all good, sound reasons why there are more "Clevelands" in operation in this country and abroad than any other make of automatics.

Capacities 1-4 inch to 6 3-4 inches.
Operating Expense One Mill a Minute.



Piece No. 553. Material, machine steel, made on a 2-inch New Model Cleveland Automatic Turret Machine. Time, 20 minutes for all operations.

This is a sample of "Cleveland" work—mail us samples or drawings of your work and we will send complete specifications explaining outputs, cost of machines and tools, etc.

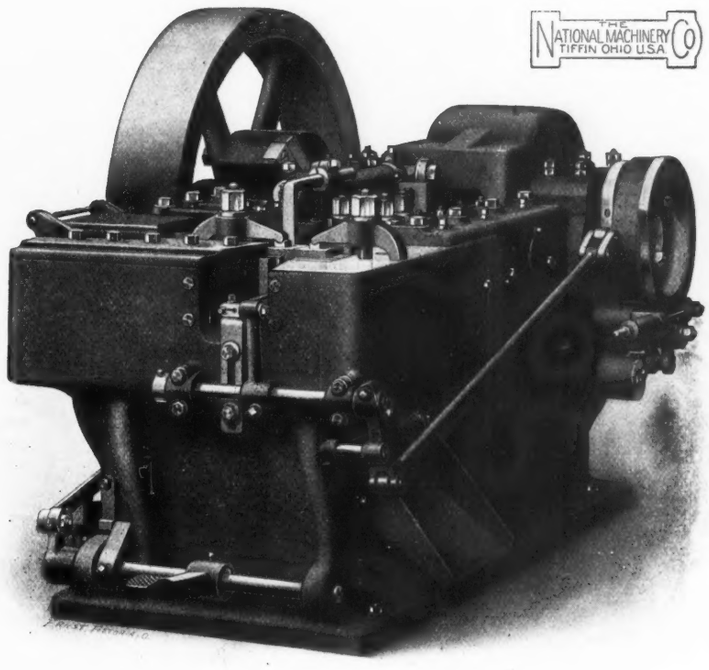
CLEVELAND AUTOMATIC MACHINE CO.

CLEVELAND, OHIO, U. S. A.

Eastern Representative—J. B. Anderson, 2450 No. 30th St., Philadelphia.

Western Representative—Herbert E. Nunn, 562 Washington Boulevard, Chicago.

Foreign Representatives—Chas. Churchill & Co., London, Manchester, Birmingham, Newcastle-on-Tyne and Glasgow. Alfred H. Schutte, Cologne, Brussels, Paris, Milano and Bilbao. Donauwerk Ernst Krause & Co., Berlin, St. Petersburg, Stockholm, Copenhagen, Austria-Hungary and the Balkan States. Andrews & George, P. O. Box 66, 242 Yokohama, Japan.



NATIONAL WEDGE GRIP BOLT AND RIVET HEADERS

are demonstrating every day in R. R. Shops, Bolt, Bridge, Implement and General Industrial Plants, that they produce better bolts, rivets and forgings and cost less for Dies and general maintenance, than any "toggle" or other type of Header.

Comparative tests show that Dies last **three** to **five** times longer, requiring less shut-down for die changes, redressings, etc.

The superior construction, advanced features in design and longer die life practically eliminate periods of idleness for petty repairs, die changes and the like, making the "Wedge Grip" Header a machine for almost constant operation, and increasing the output **15** to **25**% over that secured in other types of Heading Machines.

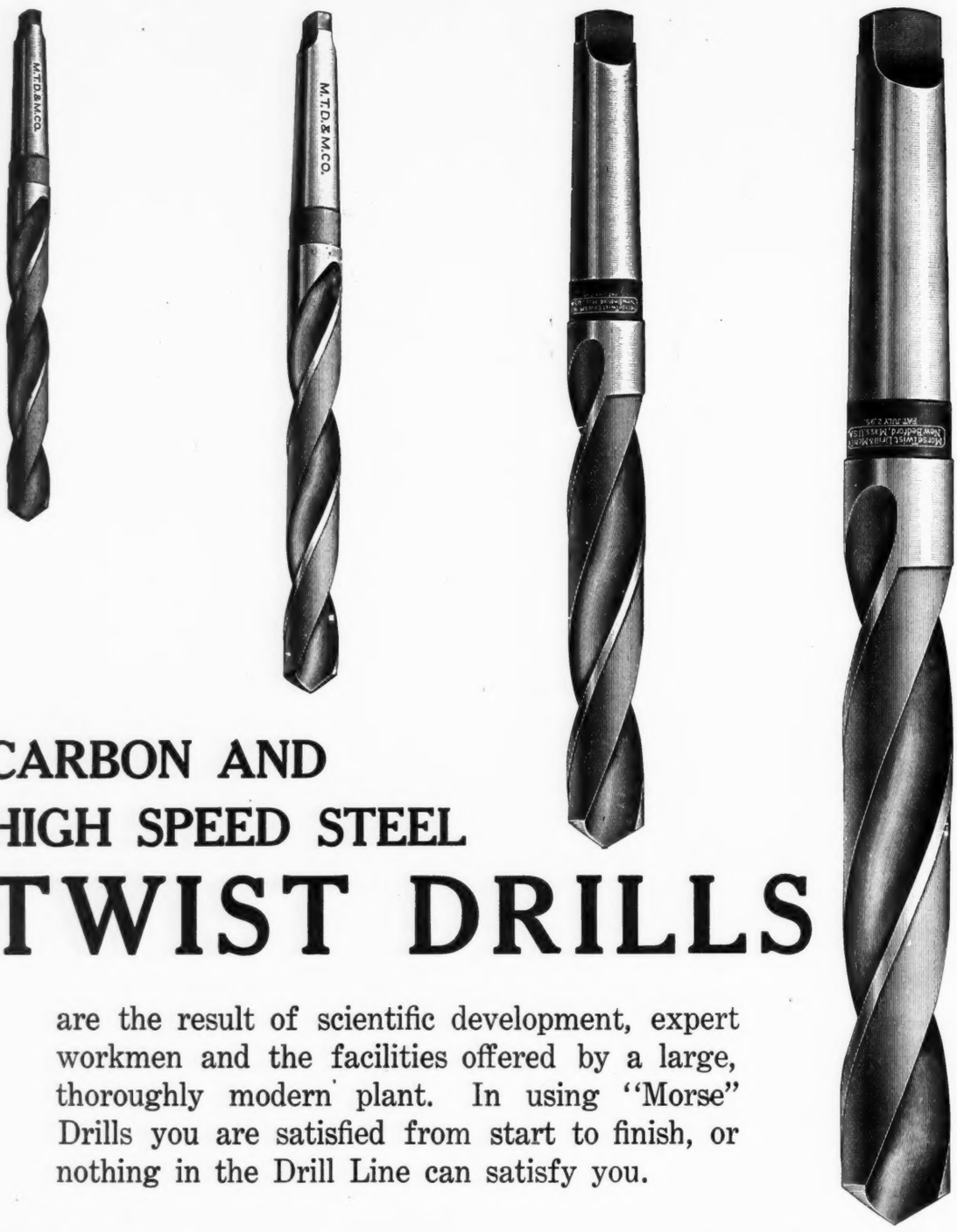
National "Wedge Grip" Bolt Headers are built in ¾, 1, 1½, 2 and 2½" sizes for bolt and forging work, and ½, ¾, 1, 1¼, and 1½" sizes for continuous operation on rivets and the like.

We'll be pleased to forward you full information and show you the advantages of using this type of Header on your work, if you are interested.

THE NATIONAL MACHINERY CO., TIFFIN, O., U.S.A.

ORIGINATORS OF MODERN BOLT, NUT AND FORGING MACHINERY

"MORSE"



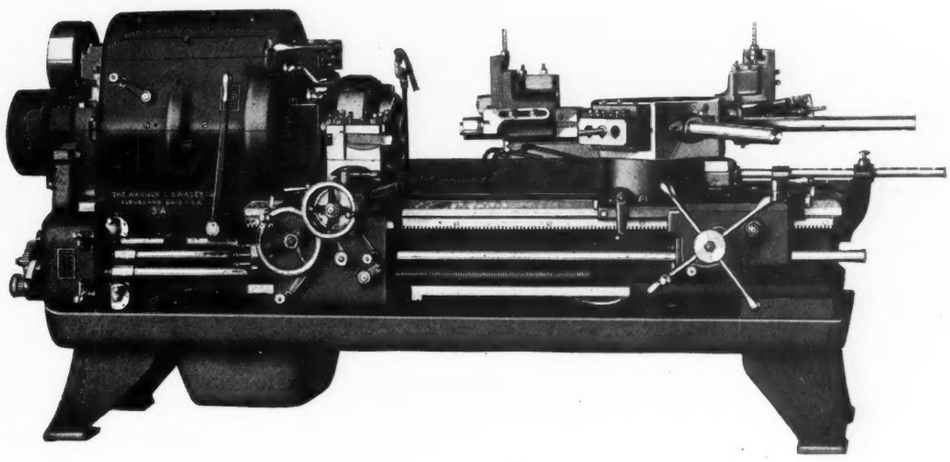
CARBON AND HIGH SPEED STEEL

TWIST DRILLS

are the result of scientific development, expert workmen and the facilities offered by a large, thoroughly modern plant. In using "Morse" Drills you are satisfied from start to finish, or nothing in the Drill Line can satisfy you.

MORSE TWIST DRILL & MACHINE CO.

NEW BEDFORD, MASS., U. S. A.



A New Hollow-Hexagon Turret-Lathe
One Machine that Takes the Place of Two

THE engraving illustrates the new No. 3A Hollow-Hexagon Turret-Lathe—the latest product of the Warner & Swasey shops.

It is a powerful turret-lathe for the rapid, accurate and continuous production of duplicate parts from bar-stock, forgings or castings.

It is designed to meet every requirement as a manufacturing machine for bar and chucking-work; yet its convenience, adaptability and wide range make it immediately available for economical production in small lots and great variety.

Bar-stock up to 3⅛″ in diameter can be fed through the automatic chuck. Any length up to 36″ can be turned at one chucking. Castings or forgings up to 15″ in diameter can be held in the three-jaw chuck. Swing over bed, 23″; over carriage, 17½″.

Full particulars of design and equipment sent upon request.

The Warner & Swasey Company, Cleveland, Ohio

TURRET-LATHES, SCREW-MACHINES, BRASS-WORKING MACHINE TOOLS

New York Office—Singer Bldg. Detroit Office—Ford Bldg. Chicago Office—Commercial Nat'l Bank Bldg.

FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Schuchardt & Schutte, Berlin, Vienna, St. Petersburg, Stockholm, Copenhagen and Budapest. Alfred H. Schutte, Cologne, Paris, Brussels, Liege, Milan, Madrid, Bilbao and Barcelona. A. R. Williams Machinery Co., Toronto, Ont. Williams & Wilson, Montreal.

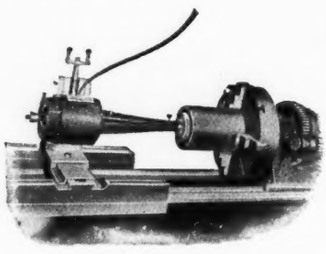
United States Electrical Tools

Will Finish the Work where it Stands

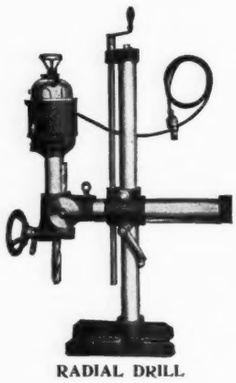
Practically all your grinding, drilling and polishing can be done by **U. S. Portable Electric Tools,** and done with greater dispatch and economy.

¾–1–1¼–1½"

Your first-cost saving, the purchase of a powerful, portable machine instead of costly stationary machinery, is supplemented by the enormous economy of time and labor that follows taking the tools to the work, instead of the work to the tools.

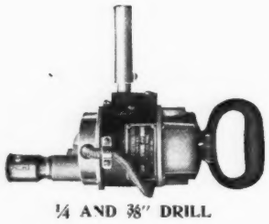


INTERNAL GRINDER



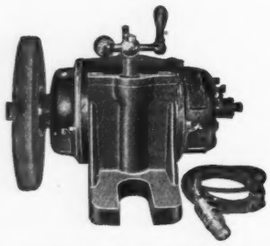
RADIAL DRILL

You have power for each operation wherever a wire will go; the change from one operation to another is accomplished in the time it takes to tell of it, and the cost of each piece of work, as well as the investment, is reduced to the minimum.



¼ AND ⅜" DRILL

U. S. Machines are built for hard service as well as good service, and are furnished in various styles and sizes.



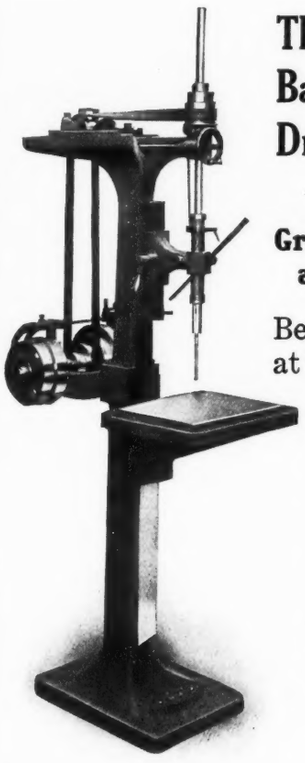
1 AND 2 H. P. GRINDER

We have interesting figures to send with Catalog "G" if you wish.

THE UNITED STATES ELECTRICAL TOOL CO.

New York Office, 50 Church St. 6th and Mt. Hope Sts., CINCINNATI, OHIO

FOREIGN AGENTS—The Canadian-Fairbanks Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver. Agents for Sweden: Wilh. Sonesson & Co., Malmo, Stockholm and Gothenburg. Agents for Denmark, Norway and Finland: Aktieselskabet Wilh. Sonesson & Co., Copenhagen City and Freeport. Selson Engineering Co., Ltd., London, England. J. S. Cock, Christiania, Norway. E. Sonnenthal, Berlin, Germany. Glaenzer, Perreaud & Thomine, Paris, France. Hans Schulze, Bruenn, Austria. Andrews & George, Yokohama, Japan.



The Avey Ball Bearing Drilling Machine

will give you

Greater Production at Reduced Cost

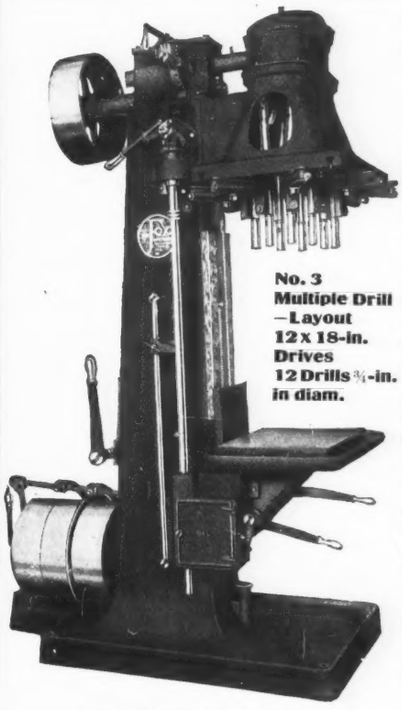
Because it can be run at higher speed than other machines and is the quickest, simplest and easiest adjusted.

No Time Wasted

Built in Single and Multiple Spindles. Various Sizes.

Get our circulars.

The Cincinnati Pulley Machinery Co.
CINCINNATI



No. 3 Multiple Drill—Layout 12 x 18-in. Drives 12 Drills ¾-in. in diam.

FOX Multiple Spindle DRILLS

The drill shown has a constant speed drive pulley. All the changes of drill speeds and table feeds are obtained through gears of either sliding or tumbler type. The drive pulley is of large diameter and broad face, eliminating belt slippage in drilling.

This machine has an extra long distance from the drilling table to the end of the spindles to accommodate tall jigs.

The machine is specially adapted for drilling steel, using high speed drills at high speeds and heavy feeds.

We build Multiple Spindle Drills to cover rectangular and irregular layouts, from 9″ x 12′ to 16′ x 30′, and circular layout from 9″ to 30″ in diameter.

Write Today for Full Information

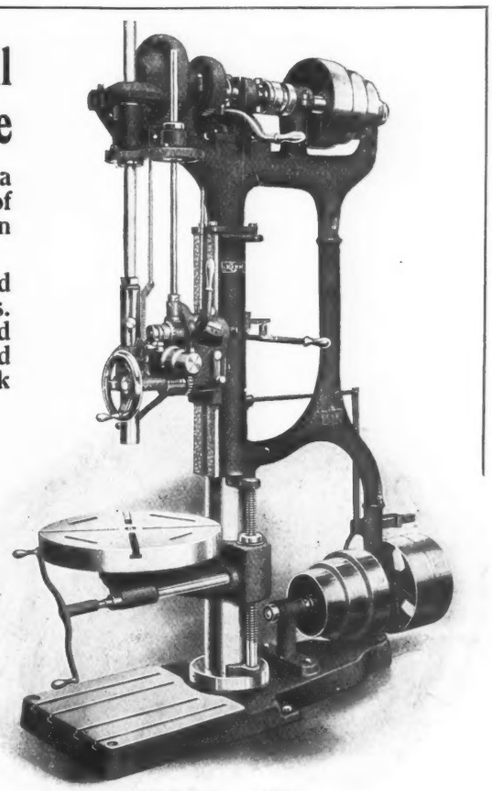
FOX MACHINE CO.
16 N. Front St., Grand Rapids, Mich.

The KERN 25 inch High Speed Drill is a Model of Strength and Convenience

The extensive use of high speed twist drills has put a good many of the older style drilling machines out of the game. Kern Drilling Machines are modern in design and practical in operation.

On the tool shown, a very powerful drive is furnished by the extra size three step cone and double back gears. Nine changes of spindle speed and eight rates of feed cover a full line of drilling. Tapping attachment located on the top housing, between the cone and double back gears, provides for any tapping required. With all levers and handles on the right side of the machine, the operator's convenience is considered and much time saved.

The 25″ is one of a full line of Upright Drilling Machines. *Send for catalogue.*



25″ HIGH SPEED DRILL

The Kern Machine Tool Co., Cincinnati, O.

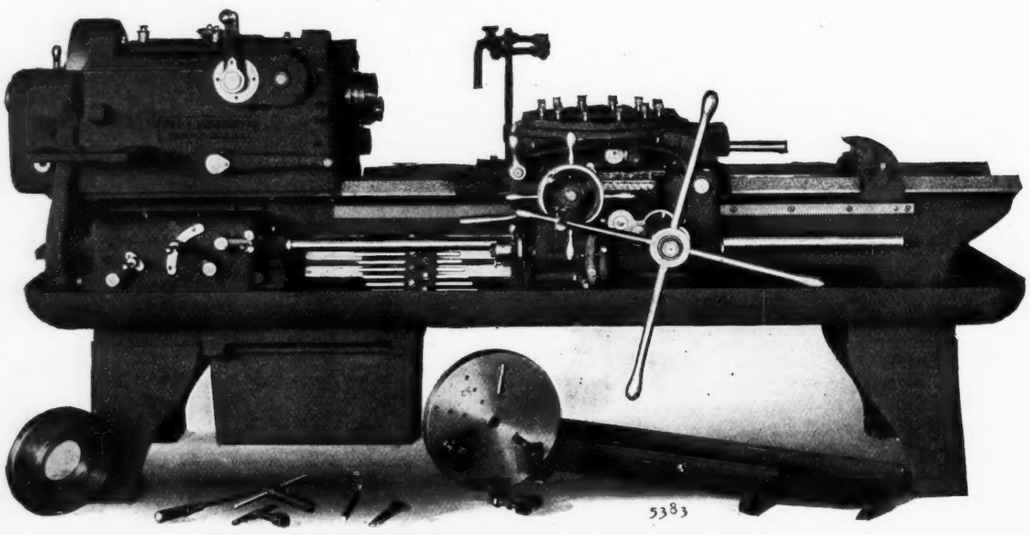
AGENTS—The National Supply Co., Toledo. Manning, Maxwell & Moore, Cleveland and San Francisco. Chandler & Farquhar Co., Boston. C. H. Wood Co., Syracuse. Aumen Machinery and Supply Co., Baltimore. The E. A. Kinsey Co., Cincinnati and Indianapolis. The E. L. Essley Machinery Co., Chicago and Milwaukee. Fairbanks Co., New Orleans. Crane Co., Birmingham. Hendrie & Bolthoff Mfg. & Supply Co., Denver. J. W. Wright & Co., St. Louis. Williams & Wilson, Montreal. A. R. Williams Machinery Co., Toronto. Alfred Herbert, Ltd., Coventry and Paris. De Fries & Co., Dusseldorf and Milan. J. Lambercier & Co., Geneva. Nienstaedt & Co., Copenhagen. E. Isbecque & Co., Antwerp. Van Rietschoten & Houwens, Rotterdam.

A MACHINE FOR MODERN MANUFACTURE

The P. & W. Turntable Lathe

With Cross Sliding Turntable

Is so designed that its accuracy is rigorously maintained under heavy demands, yet its adaptability and convenience insure economy on small lots.



P. & W. 2½ x 26-in. Turntable Lathe

Mechanically the P. & W. Turntable is constructed to "stand up" to the limit of high speed tool steels. This is evident by the compact head bolted rigidly to the massive bed—a bed 30% heavier than the usual lathe of its size.

A turntable with a liberal bearing in the slide, a rigid binding device that locks the turret directly under the cutting tool, and positive accurate stop systems for longitudinal and cross feeds, maintain the "set up" and produce exact duplication of work throughout the entire job.

The general conveniences of the machine—instantaneous speed and feed changes, a standard, simple, adaptable and quickly set up tool equipment and equal facilities for bar and chuck work, make the P. & W. Turntable Lathe an efficient and economical machine for any output.

Write for Catalog, "Turntable Lathe."

PRATT & WHITNEY CO., Hartford, Conn., U.S.A.

SALES OFFICES—**New York**, 111 Broadway. **Boston**, Oliver Bldg. **Philadelphia**, 21st and Callowhill Sts. **Pittsburgh**, Frick Bldg. **Chicago**, Commercial National Bank Bldg. **St. Louis**, 516 No. 3d St. **Detroit**, Majestic Bldg. **Cleveland**, The Niles Tool Works Co., Rockefeller Bldg. **Hamilton**, The Niles Tool Works Co. AGENTS for **Gulf States**. Le Lourd & Walpole, **Birmingham, Ala. California, Nevada and Arizona**, Harron, Rickard & McCone, **San Francisco and Los Angeles. Washington and Idaho**, Hallidie Machinery Co., Seattle and Spokane. **Oregon**, Portland Machinery Co., Portland.

AGENTS for **Canada**, The Canadian Fairbanks Co., Ltd., Montreal, St. John, Toronto and Vancouver. **London**, E. C., Buck & Hickman, **Ltd., 2 and 4 Whitechapel Road. London**, S. W., Niles-Bement-Pond Co., 23-25 Victoria St. **Birmingham**, Pratt & Whitney Co., Exchange Bldgs., New St. **Paris**, Fenwick Freres & Co., 8 Rue de Rocroy, Agents for **France. Belgium and Switzerland. Italy**, Ing. Ercole Vaghi, Milan. **Germany**, F. G. Kretschmer & Co., Frankfort a. M. **Austria-Hungary**, E. Krause & Co., Vienna, Prag and Budapest. **Holland**, Van Rietschoten & Houwens, West Zeedijk 554, Rotterdam. **Japan**, F. W. Horne, 70-C Yokohama.

Erecting Floor Economy

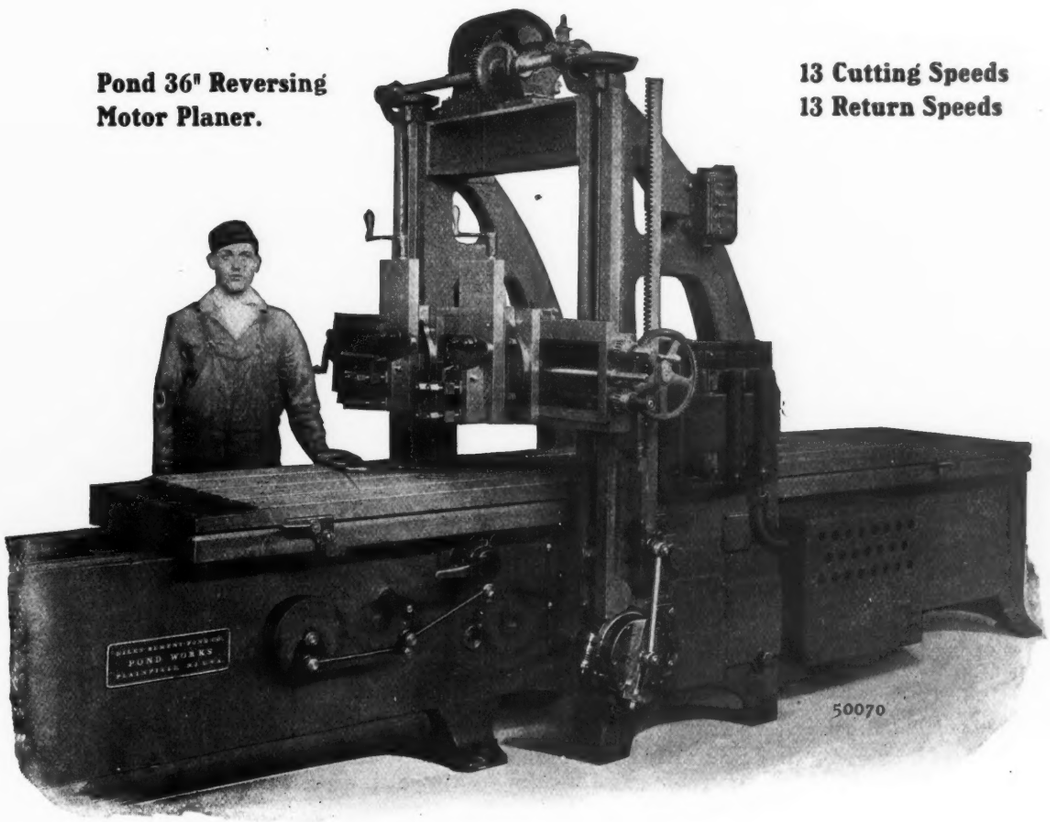
Eliminate the long delays due to tedious hand scraping on poorly machined ways on Lathe and Planer Beds, bearing surfaces of Radial Drill Posts, Housings, Cross Rails, Carriages, Slides, Tables, Taper Gibs, and all surface bearing machine parts by installing

Pond Reversing Motor Planers

With Pond Patent Planer Control

Pond 36" Reversing Motor Planer.

13 Cutting Speeds
13 Return Speeds



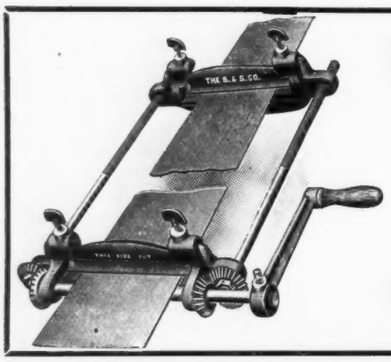
The motor directly connected to the driving shaft prevents any slipping between motor and table. The power is transmitted through accurately cut steel gears, and gives a positive, firm and steady table action with an accuracy of stroke heretofore unknown. Add to this the ability to always obtain the exactly correct speed, instantly, for any kind of tool used on any kind of metal, then your Planer work will be machined with an accuracy and finish heretofore mechanically unattainable.

Merely sliding a thumb piece across an index scale on the controller gives any one of the thirteen speeds. Motor responds immediately, whether under cut or on return stroke.

Write for folder "Pond Planers." Operation is explained in detail.

111 Broadway, New York, U. S. A. **NILES-BEMENT-POND CO.** **23-25 Victoria Street, London, S. W.**

SALES OFFICES—**Boston,** Oliver Bldg. **Philadelphia,** 21st and Callowhill Sts. **Pittsburgh,** Frick Bldg. **Cleveland,** The Niles Tool Works Co., Rockefeller Bldg. **Hamilton, O.,** The Niles Tool Works Co. **Detroit,** Majestic Bldg. **Chicago,** Commercial National Bank Bldg. **St. Louis,** 516 No. Third St. AGENTS for **Gulf States,** Le Lourd & Walpole, **Birmingham, Ala.** AGENTS for **Colorado,** Hendrie & Bolthoff Mfg. and Supply Co., **Denver. California, Nevada** and **Arizona,** Harron, Rickard & McCone, San Francisco and Los Angeles. **Washington** and **Idaho,** Hallidie Machinery Co., Seattle and Spokane. For **Oregon,** Portland Machinery Co., Portland. AGENTS for **Canada,** The Canadian Fairbanks Co., Ltd., Montreal, St. John, Toronto and Vancouver. **Italy,** Ing. Ercole Vaghi, Milan. **Germany,** F. G. Kretschmer & Co., Frankfort a/M. **Japan,** F. W. Horne, 70-C Yokohama. **Austria-Hungary,** E. Krause & Co., Vienna, Prag and Budapest.



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This device is simple, but very efficient. The ends of the belt are placed between the two movable jaws, the upper section of each being in the form of a cam, which automatically closes upon the belt as it is drawn together, giving a pressure sufficient to hold it securely, but without injury to the belt. We furnish 7 sizes, for belts from 8" to 32". *Write for circular.*

THE BILLINGS & SPENCER CO., Hartford, Conn.

CLAIRE L. BARNES & CO., McCormick Building, CHICAGO.

"PARAGON FLATWIST" DRILLS

are forged from bars of best quality High Speed Steel. The "Paragon" shank is a flat taper shank rounded on the narrow edges and tapering on both the flat sides and round edges, the taper of the latter being the same as that of the regular taper shanks. This shank is one piece with the drill—forged and ground without weld or joint from the original bar.

Write for folder No. 281—it gives description and prices of this efficient drill.

The CLEVELAND Twist Drill Co.

New York Cleveland, O. Chicago

See announcement of World's Drilling Record on page 31.

COES WRENCHES

Steel Always Reliable

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COES WRENCH CO., - Worcester, Mass.

Or, J. H. Graham & Co., J. C. McCarty & Co., N. Y.

Automatic and Special Machinery

of all kinds designed and built. Inventions perfected. Builders of Variable Speed Iron Planers. Correspondence Solicited.

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The W. A. Wilson Machine Co.

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PAID FOR ITSELF IN TWO WEEKS

The work of EIGHT MEN is now being done on a GRANT NOISELESS ROTARY RIVETER by a boy.

The work produced on the machine is much superior to the hand or hammer blow method.

Hammer and tool marks entirely eliminated; absolutely no possibility of marring the work with a GRANT RIVETER.

We invite you to send us samples that we may demonstrate to you just what we can do.

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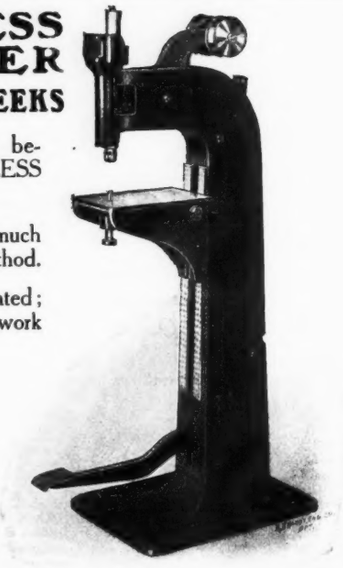

The Grant Mfg. & Machine Co.

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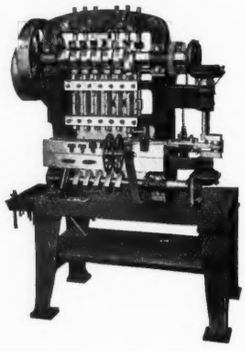

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SINGLE, DOUBLE AND TRIPLE ACTION PRESSES

Presses of almost every description for working sheet metal.

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WATERBURY, CONN., U. S. A.

Cleveland Office: 1012 Williamson Bldg.

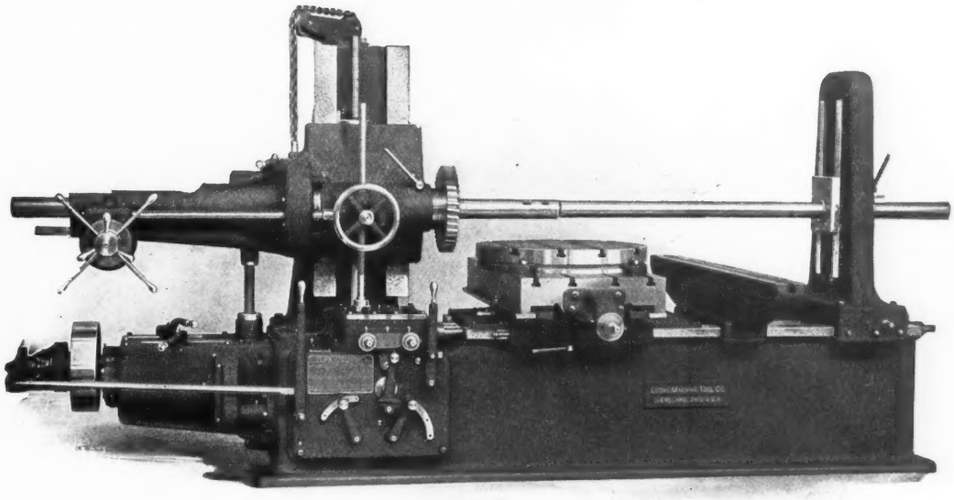
MR. MANAGER

This is addressed to YOU

A good many foremen and superintendents have told us that the men always prefer to use the

"PRECISION"

Boring, Drilling and Milling Machine



Why do the men prefer to use it? Because they want to

MAKE A RECORD

and they can make it easier and quicker by using the "PRECISION."

THE REASON

that they want to make a record is that they want to make

MORE MONEY

and they know that they must make a record first.

A RECORD by the man is also a record for the foreman and the superintendent, and a record for the works.

A RECORD for the works is a record for the MANAGER and the manager doesn't object to more money, either.

It is up to the manager to buy the kind of machine that will allow the record to be made—the "PRECISION" is IT.

Lucas Machine Tool Co., Now and always of **Cleveland, O., U. S. A.**

EUROPEAN AND AUSTRALIAN AGENTS: C. W. Burton, Griffiths & Co., London. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Schuchardt & Schutte, Berlin, Stockholm, St. Petersburg, Copenhagen. Donauwerk Ernst Krause & Co., Vienna and Budapest. Overall, McCray, Ltd., Sydney, Australia. Andrews & George, Yokohama, Japan. Williams & Wilson, Montreal.

power absorption of milling machines, milling operations, the backing-off lathe, and the grinding of cutters. From every standpoint the book is prepared in a most thorough and complete manner, and is a work that can be highly recommended.

CATALOGUES AND CIRCULARS

BRISTOL CO., Waterbury, Conn. Leaflet of Bristol gages.

DODGE MFG. CO., Mishawaka, Ind., has presented a new booklet on the Dodge solid friction clutch illustrated with several halftones.

READY TOOL CO., Bridgeport, Conn. Folder listing and illustrating the new Red-E offset side tools, boring-bar and round nose roughing tools recently brought out.

BAKER BROS., Toledo, Ohio. Catalogue No. 7-B, illustrating and describing high-speed drilling machines, cylinder boring machines and tapping machines of original and interesting design.

EDGECOMBE CO., Cuyahoga Falls, Ohio, has issued two little pamphlets entitled, respectively, "The Right Way to Make a Pipe Joint and the Reason Why" and "Leaky Pipe Joints, the Cause and Cure."

MATTHEWS-DAVIS TOOL CO., 219 N. Second St., St. Louis, Mo. Circular on the Davis expansion boring tools, and testimonial letters from the mechanical officers of railways on the efficiency of the tools.

SAFETY POWER TRANSMISSION CO., 114 Franklin St., New York. Circular illustrating a safety shaft guard for preventing accidents, consisting of a casing completely enclosing machinery lineshafts and couplings.

HAMMACHER, SCHLEMMER & CO., Fourth Ave. and Thirteenth St., New York. Circular of fire extinguishers, fire tanks, fire buckets, fire hooks and other apparatus for fire extinguishment in shops, mills and factories.

CRESCENT MACHINE CO., Leetonia, O. This company is a little beforehand in publishing its 1912 catalogue which is now ready for distribution. It is a well illustrated booklet of handbook size. The articles in it, not mentioned in former catalogues, are a new planer, post borer and band-saw guards.

B. F. STURTEVANT CO., Hyde Park, Mass. Catalogue No. 180 is an elaborate publication descriptive of the Sturtevant multi-vane volume fans, replete with numerous typical installations showing just where the fans can be used and also giving a lot of data of value to those purposing installing such apparatus.

GENERAL ELECTRIC CO., Schenectady, N. Y. Bulletins: No. 4818, "Couplings"; No. 4829, "Electric Locomotives for Industrial Railways"; No. 4832, Commutating Pole Generators, Type DLC"; No. 4846, "Alternating Current Switchboard Panels"; and No. 4852, "Fifty-ton Electric Locomotives for Interurban Roads."

P. H. BONVILLAIN & E. RONCERAY, Paris, France, have recently published a catalogue (in French) on molding machinery which contains a great deal of valuable information on the art of machine molding. It should be considered more as a textbook than as a catalogue, for methods and processes are here described in some detail.

PUTNAM MACHINE CO., Fitchburg, Mass. In a booklet entitled "Cooperative Industrial Education," a paper by W. B. Hunter, director of the industrial department of the Fitchburg, Mass., high school is presented, outlining the "Fitchburg Plan" of industrial education, giving the various reasons why the methods employed in the system have been adopted. It is a very instructive booklet for any who are interested in the problems of industrial education.

NORTON CO., Worcester, Mass. Booklet entitled "Safety as Applied to Grinding Wheels," illustrating and describing preventive and protective safeguards, which can be practically applied in the use of grinding wheels and machines. The booklet should be appreciated generally in these days when so much attention is being given to the investigation and study of accidents, the cause of same and means of prevention. Copies will be sent free to any address.

INTERNATIONAL OXYGEN CO., 68 Nassau St., New York. Pamphlet on the I. O. C. system of generating oxygen and hydrogen for cutting, welding and other purposes. The company operates a plant at Waverly Park, Newark, N. J., for the production of pure oxygen and hydrogen, and furnishes gas generating appliances of French design, for the production of oxygen and hydrogen electrolytically. The process insures that the gases are free from impurities, such as chlorine or nitrogen.

MESTA MACHINE CO., Pittsburg, Pa. Catalogue of steam-hydraulic quick-acting forging and bending presses built under patents of Haniel & Lueg, Dusseldorf, Germany. The construction and operation of this type of press is described in detail and there are a number of interesting illustrations showing presses of various sizes and designs. The capacity of these presses varies from 100 to 15,000 tons. The larger sizes are of the four-column type and the smaller ones can be made of the single-frame type up to 450 tons capacity.

NILES-BEMENT-POND CO., New York, has issued an attractive catalogue on its reversing motor-drive planers. All the planers of this type made by the company are illustrated, particular attention being paid to the feature of the reversing motor, description of which was given in the department of New Machinery and Tools for July, 1910. The possibilities of this drive are shown by a casting weighing 17,000 pounds, on which six different cuts have been taken, illustrating the sensitiveness of the reversal and the control under which the machine is held at all times.

TRADE NOTES

WILFRED J. SPRUSON, corner King & Elizabeth Sts., Sidney, Australia, consulting engineer, would be glad to receive catalogues and circulars from American machinery manufacturers.

J. N. LAPOINTE CO., Marlboro, Mass., is a corporation recently organized for the purpose of manufacturing broaching machines and tools. J. N. Lapointe is president and manager, F. J. Lapointe, secretary, and M. C. Lapointe, treasurer.

TECHNICAL PUBLICITY ASSOCIATION, Fred R. Davis, secretary, room 1733, 30 Church St., New York City, has issued the *T. P. A. Bulletin* in new form, 9 by 12 inches. The May number contains the official reports for the year just completed, including the minutes of the annual meeting in April.

PHILADELPHIA GEAR WORKS, 1120-1122 Vine St., Philadelphia, Pa., formerly Philadelphia Gear Works, Inc., has been re-incorporated. Officers are: George L. Markland, Jr., president and treasurer; Robert J. Coulter, vice-president; Russell C. Ball, secretary; George B. Grant, mechanical engineer.

IRONTON PUNCH & SHEAR CO., Ironton, Ohio, which has taken over the business of the Cincinnati Punch & Shear Co., Cincinnati, Ohio, has secured a permit to erect a modern steel factory building, which will extend from Aetna to Hecla Sts. The contract for the new building has been awarded to the Riverside Bridge Co.

RICHARDSON-PHENIX CO., Milwaukee, Wis., manufacturer of appliances for lubrication, announces that it has opened a new engineering sales office in Philadelphia, Pa., located in the Real Estate Trust Bldg. This office is under the management of Mr. J. F. McIndoe, who has had several years' experience in general machinery lubrication.

D. SAUNDERS SONS, Yonkers, N. Y., makers of pipe machines, performed an unusual act in distributing $35,000 to twenty-seven employes. The gift was in the nature of a memorial of Leslie Saunders, the late head of the company. Each of the Saunders' employes received $1000, except five who had worked in the Saunders' shop for nearly forty years; they received something more than $2000 apiece.

STANDARD TOOL CO., Cleveland, Ohio, announces the opening of a Western branch at 552 West Washington Boulevard, Chicago, Ill. In this store a complete stock of all styles of twist drills, reamers, milling cutters, taps, drill chucks, taper pins, etc., manufactured by the company, will be carried for immediate delivery of orders. The convenience of the new arrangement will be appreciated by the trade in Chicago and the West.

STRONG STEEL FOUNDRY CO., Buffalo, N. Y., announces that it has just purchased ten acres of land in the suburbs of Buffalo and that plans are now being prepared for fireproof buildings which will be equipped with the most modern machinery obtainable for the manufacture of high-grade steel castings. This firm manufactures open-hearth steel castings, and has recently added to its line special steel castings, such as vanadium, chrome, nickel, titanium and manganese.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Boston, Mass., announces that its advance course in electrical engineering was such a success last year and that the graduates who took the course have been so well placed that the applications for permission to become candidates in this work are more numerous than they have been heretofore. This is particularly true for graduate students who propose studying electric railroads, roller electric transmission and the scientific management of public service companies.

J. & A. CHURCHILL, 7 Great Marlborough St., London W., England, under the editorship of Mr. H. H. Stevenson, are publishing a new book entitled "Who's Who in Science." This book of reference is to contain the names, appointments and achievements of the world's foremost scientists. The intention is to make this new book an annual, the aim being to enable scientists to communicate with each other all over the world, and to give a rapid summary of the achievements and careers of great men.

CLEVELAND TWIST DRILL CO., Cleveland, Ohio., calls attention to the remarkable drilling records established at the late convention of the American Railway Master Mechanics' and Master Car Builders' Associations at Atlantic City, with Cleveland twist drills. One of the records made with a stock 1¼ inch "Paragon Flatwist" high-speed drill was the removal of 70.55 cubic inches of cast iron in one minute, cutting through a heavy casting at the rate of 57½ inches per minute. This is believed to break all records of rapid drilling in cast iron.

DAVIS-BOURNONVILLE CO., 97 West St., New York, announces that the Davis-Bournonville Acetylene Development Co., and the National Pneumatic Co., have appointed the Davis-Bournonville Co. their exclusive selling agents for welding and cutting apparatus. The business of the Davis-Bournonville Co. will be divided into the Eastern department with offices in its present quarters, and the Western department with offices at 515 Laflin St., Chicago, Ill., the present quarters of the Chicago welding department of the National Pneumatic Co.

WAGNER ELECTRIC MFG. CO., St. Louis, Mo., announces the formation of the Wagner Electric Mfg. Co., Ltd., of Canada, under a Dominion charter with a capital stock of $50,000, fully paid. The Canadian corporation is to have the exclusive Canadian rights to operate the patents owned by the St. Louis company. The headquarters of the new company will be in the same location as the branch formerly maintained in Canada in the Bell Telephone Bldg., Montreal, Que. The president of the new company is to be S. M. Dodd.

KEMP MACHINERY CO., 19 E. Lombard St., Baltimore, Md., succeeded to the business conducted by J. P. Kemp, July 1. The business will be continued with the association of Mr. S. V. Kemp, who has had a wide experience in mechanical and engineering work. The Kemp Machinery Co. will represent among others the following well-known manufacturers: Lodge & Shipley Machine Tool Co., Cincinnati Milling Machine Co., Cincinnati Bickford Tool Co., Cincinnati Planer Co., Colburn Machine Tool Co., Acme Machine Tool Co., Mechanics Machine Co., Gould & Eberhardt, Lea Equipment Co., and Loew Mfg. Co.

ARMOR STEEL FOUNDRY CO., Winton Place, Cincinnati, Ohio, successor to the Steel Foundry Co. of the same place, and the Armor Steel Foundry Co. of Matthews, Ind., has about completed all the alterations and additions to its works. Among the additions is the installation of a side blow converter and cupola which will better enable the company to manufacture small castings for automobile and machine tools. The company is prepared to make castings up to ten tons weight, either in basic or acid open hearth or converter steel. Also castings of any desired alloy, including manganese, chrome, titanium, nickel, and castings surface-hardened by the "Gebhard" process.

WINDSOR MACHINE CO., Windsor, Vt., has appointed H. W. Wells Western sales manager for the sale of Gridley automatic turret lathes, which heretofore have been handled exclusively by Manning, Maxwell & Moore, Inc. Mr. Wells was purchasing agent in charge of purchases of machinery for the International Harvester Co. He has purchased the largest equipment of machinery of any purchasing agent in the United States, having bought equipments for the foreign plants of the International Harvester Co. at Lubertzy, Russia; Norchippening, Sweden; Croix, Germany; Norde, France; Akron, Ohio, and the Tractor Works, Chicago. He will have several representatives with him in the Western territory.

WORCESTER POLYTECHNIC INSTITUTE, Worcester, Mass., will be enlarged by the addition of a new building at the hydraulic testing plant at Chaffins Station, Holden. The new building, which is to be ready for class work in the fall, is to be of the same general character as the main hydraulic laboratory. It will be 36 by 32 feet, one story, with a basement, including a wooden flume, containing two turbine wheels under a head of 14 feet and developing about 40 H.P. The other equipment provided will afford an excellent opportunity for doing research work along various lines of hydraulic engineering on a large enough scale to be of practical value.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION has issued through its secretary, the official report of the semi-annual convention at Atlantic City, N. J., May 18 and 19, in a handsome book of 230 pages. In addition to other interesting and valuable matter it contains the following papers: "Department Plan of Machine Tool Arrangement on the Basis of Equipment," by F. G. Kent; "Department Plan of Machine Tool Arrangement on the Basis of Product," by C. B. Auel; "The Principles of Scientific Management," by F. W. Taylor; "The Proper Distribution of Expense Burden," by A. Hamilton Church; "Employers' Liability and Workers' Compensation," by F. C. Schwedtman and James A. Emery. The secretary of the association is Mr. Charles E. Hildreth, Worcester, Mass.

WHERE HIS TOOLS ARE HIS BREAD and BUTTER!

Showing Case Open and Drawers Exposed

Considering their first cost and the character of the work they do, a machinist's tools are worthy a proper case.

They must be get-at-a-ble, handy, easy to take out and put back—therefore,

The H. S. & Co. Portable Tool Case

with its 8 drawers (containing 3 1-5 square feet of room), provides a case at once useful, portable, serviceable, and at a moderate price.

Made of solid oak, highly finished, brass trimmed, and withal, a really beautiful case. Outside dimensions, 15⅝" long, 8" deep, 10¾" high.

$10.00 Each Net, F. O. B., New York.

(With each order we will include a copy of our 1200-page General Tool Catalog.)

Special Circular No 2924, giving detailed information, upon request.

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HAMMACHER, SCHLEMMER & COMPANY

Hardware, Tools and Supplies

New York, Since 1848

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CONTENTS FOR AUGUST

The first column of page numbers applies to the Engineering and Railway Editions; the Second to the Shop Edition.

METHODS AND MACHINES USED IN MANUFACTURING THE VEEDER CYCLOMETER. Erik Oberg	935	639
MACHINING AUTOMOBILE CONNECTING RODS. E. H. Pratt	941	645
DROP-FORGE DIE-SINKING—2. Chester L. Lucas and J. W. Johnson	944	648
EDITORIAL	950	654
ESTIMATING STOCK FOR SCREW MACHINE PRODUCTS. S. M. Hovis	951	
THE MANUFACTURE OF A DIRECT-CURRENT MOTOR. A. M. MacFarland	952	
MAKING DUPLICATE DROP-FORGING DIES. C. H. Wilcox	958	
DESIGN OF POWER PRESSES AND SHEARS. Hart Preston	960	
CALCULATING HORSEPOWER FROM DYNAMOMETER TESTS	965	
MAKING DIES FOR PRESSURE CASTINGS. A. W. Christianson	966	
THREAD ROLLING. Douglas T. Hamilton	967	
HARD VS. SOFT CAST-IRON WAYS FOR MACHINE TOOLS. Robert Grimshaw	972	
SHRINKAGE AND PRESS FITS IN THE BRADFORD SHOPS	973	
THE MULTIPLE PLUNGER PRESS. Charles Doescher	975	655
KNIGHT'S SLIDE-VALVE MOTOR	978	658
MACHINE SHOP PRACTICE. THE MAKING OF REAMERS—2. J. C. Custer	979	659
AUTOMATIC PISTON-RING PEENING MACHINE. J. A. Luther	981	661
DEVICE FOR TESTING BALL-RACES. William G. Winter	984	664
A SHELL-HEADING DIE. W. J. Kirkman	984	664
FRESH AIR AND NEW IDEAS FOR DRAFTSMEN. H. W. Weisgerber	985	665
PRESS TOOLS FOR MAKING AUTOMOBILE LAMP-GLASS RETAINING RING. Aron Lawrence	985	665
WHAT IS A MACHINE TOOL? John S. Myers	986	666
TAPS AND TAPPING. Alexander Bliden	986	666
VISE JAW FOR HOLDING ROUND PIECES WHILE SLOTTING. Designer	987	667
PLANING A LARGE FLYWHEEL. A. Wind	987	667
A COLLECTION OF PIERCING PUNCHES USED IN DIE MAKING. Arthur F. Kunze	987	667
SIZE OF PIPES FOR A DUST-COLLECTING SYSTEM. Ivar Sjoblom	988	668
BACKING-OFF A LEFT-HAND TAP. Frank Lang	988	668
BENDING SHEET METAL. E. J. G. Phillips	988	668
A DEVICE FOR LAYING OUT CAMS. Alfred Laurens	989	669
ATTACHMENT FOR TRUING CRANKPINS IN THE WHEEL LATHE. August Meitz	989	669
A UNIVERSAL ANGLE PLATE. Chips	989	669
LINING UP SHAFTING. E. B. Gafkey	990	670
HOW AND WHY	991	671
NEW MACHINERY AND TOOLS	992	672
BESLY ROTARY PROCESS OF FLAT SURFACE GRINDING	1004	684
SINGLE STRAND BARBED WIRE MACHINE	1006	686

MISCELLANEOUS

Advertisements in this column, 25 cents a line, ten words to a line. The money should be sent with the order. Answers addressed to our care will be forwarded. Original letters of recommendation should not be enclosed to unknown correspondents.

AGENTS IN EVERY SHOP WANTED to sell my sliding calipers. Liberal commission. ERNST G. SMITH, Columbia, Pa.

AGENTS wanted in every works in Great Britain where draftsmen, machinists and tool-makers are employed, to represent MACHINERY and take orders for MACHINERY'S remarkably successful Reference and Data Books. Special offers give a choice of 75 Reference Books and 20 Data Books, at a shilling per copy, and subscription for MACHINERY, on monthly payments. No charge is made for credit. We supply sample copies and advertising matter describing the books in detail, for distribution in Engineering Works. Write us for full information. WM. DAWSON & SONS, LTD., Cannon House, Bream's Bldgs., London, E. C.

AN UNUSUAL OPPORTUNITY is offered to a machine shop properly equipped to take up the manufacture of a line of Machine Tools which have special features of advantage, and should be interesting to all users. The shop equipment required would be classed medium to large, with the usual range of milling machines, screw machines, gear cutters, grinders, etc. Location preferred within 100 miles of New York. Capacity to employ 200 to 300 machinists, which can be increased 50 per cent to 100 per cent. Arrangements could be made on a contract basis, or would undertake to organize and manage a shop for this line only, if suitable plant with moderate amount of capital were available. This is a straight business proposition and correspondence is solicited from those really interested as to location and present equipment, space for enlargements, etc. Address box 395, care MACHINERY, 49 Lafayette St., New York.

A THOROUGHLY WELL EQUIPPED MACHINE TOOL SHOP, having accumulated considerable of its own product, and desiring to employ its full organization, is open for work of good class, and solicits contracts for $500.00 to $50,000.00. Location, Central West. Address box 372, care MACHINERY, 49 Lafayette St., New York.

DRAFTSMEN AND MACHINISTS.—American and foreign patents secured promptly; reliable researches made on patentability or validity; twenty years' practice; registered; responsible references. EDWIN GUTHRIE, Corcoran Building, Washington, D. C.

ENGINEERING, DESIGNING, PHYSICAL AND CHEMICAL TESTS OF MATERIALS.—We are Specialists in automobile design, internal combustion motors for all purposes and power applications. We test and report on motors, mechanism and manufacturing projects, design and detail from your ideas, and, if desired, build and test the first machine. Strict privacy for such work. Do you want a specialty to manufacture? LANDAU & HOWE, Engineers, 1781 Broadway, New York.

FORMULAS AND TABLES FOR SHOP AND DRAFTING ROOM is No. 35 in MACHINERY'S Reference Books, and for practical use in mechanical work is undoubtedly the most widely useful technical book published in years. Send for free pamphlet with new offers. Address MACHINERY, 49 Lafayette St., New York.

FOR SALE.—AN UP-TO-DATE FOUNDRY AND MACHINE SHOP, doing good business, in Oregon. Good location. Address box 389, care MACHINERY, 49 Lafayette St., New York.

FOR SALE.—30-32 H. P. BACKUS GAS ENGINE, with full equipment, special muffler, spark ignition, air pump and tank for starting. Engine has been run only a short time and is in first class condition. Reasons for selling—change to electric power. ELLIS ADDING TYPEWRITER CO., 204 Morris Ave., Newark, N. J.

HAND SOAP PASTE RECEIPT. 20 cents in silver. 150 per cent profit. Box 331, Walden, N. Y.

LIGHT MACHINERY WORK done accurately and carefully from start to finish. Expert advice. Ideas developed and worked out. Address box 364, care MACHINERY, 49 Lafayette St., New York.

MOST SUCCESSFUL FORMULA for brazing cast iron; process simple, ingredients obtainable at any drug store. Results guaranteed. Price, $1.00. E. R. NASH, Hanford, Cal.

OWNER OF PATENT RIGHTS on new method machine for centering bars, would sell or lease right to manufacturer. Experimental work completed. Address box 392, care MACHINERY, 49 Lafayette St., New York.

PARTY WANTS SPECIALTY in the line of Machinery to start new manufacturing enterprise. Machine or device must have merit and stand rigid investigation. Address with particulars, "BUSINESS," care MACHINERY, 49 Lafayette St., New York.

PATENTS.—H. W. T. JENNER, patent attorney and mechanical expert, 608 F St., Washington, D. C. Established 1883. I make a free examination and report if a patent can be had and the exact cost. Send for full information. Trademarks registered.

POSITION WANTED.—Mechanical Engineer of sixteen years' experience, up-to-date in modern shop practice, good organizer and systematizer, skilled in cost reduction and increase of output, desires position as engineer or superintendent. Address box 394, care MACHINERY, 49 Lafayette St., New York.

SPEED BOSS WANTED.—A first-class, thoroughly practical man who has had experience as foreman or speed boss in an engine or pump plant. This man is wanted to go right on the machines and show the operatives, and is not wanted as an office statistician. Write very fully to box 391, care MACHINERY, 49 Lafayette St., New York.

TEST INDICATORS.—H. A. LOWE, 1374 East 88th St., Cleveland, Ohio.

WANTED.—Agents, machinists, toolmakers, draftsmen, attention! New and revised edition Saunders' "Handy Book of Practical Mechanics" now ready. Machinists say "Can't get along without it." Best in the land. Shop kinks, secrets from note books, rules, formulas, most complete reference tables, tough problems figured by simple arithmetic. Valuable information condensed in pocket size. Price postpaid $1.00, cloth; $1.25, leather with flap. Agents make big profits. Send for list of books. E. H. SAUNDERS, 216 Purchase St., Boston, Mass.

WANTED—GEAR EXPERT.—A large corporation will employ a first class Bevel Gear man who understands thoroughly the technical as well as the practical side of bevel gear production. Must be able to produce highest grade of hardened gears. Liberal salary to man who can produce the goods. State age, experience, and salary expected. Address box 393, care MACHINERY, 49 Lafayette St., New York.

WANTED.—A young man in the Machine Tool business, selling department, location New York. Must be a fairly good draughtsman; general mechanical training advantageous; moderate salary with good chance for advancement. The right man should make this position valuable. Apply by hand-written letter, giving age and general statement of experience. Address Box 396, care MACHINERY, 49 Lafayette St., New York.

WANTED.—First-class tool designer to take charge of tool drafting room of manufacturing company. Must be experienced and competent in design of jigs, fixtures, punches, dies and other special tools used for quantity production of light machine parts on an interchangeable basis. Give technical education, detailed shop and office experience, places and periods of employment, references, age and salary expected. Address "D," box 1574, Springfield, Mass.

WANTED.—By Western engineering concern, competent, capable, designing engineer draftsman to do all necessary structural and mechanical computations for designing and laying out steel revolving drag line excavators. Applicant must be equipped by education and experience for the position. In writing give age, education, experience, reference, married or single, least salary considered. Address box 390, care MACHINERY, 49 Lafayette St., New York.

WANTED.—By progressive Western manufacturing concern, an A-1 experienced, capable, chief draftsman to supervise seven draftsmen. Class of work is steam and electric hoisting machinery. Must have had at least five years' experience. Permanent position; salary $100. In writing give age, experience, education, references, reason for changing, married or single. Address X. Y. Z., care MACHINERY, 49 Lafayette St., New York.

WANTED.—GENERAL SUPERINTENDENT, capable of taking complete charge of thriving and fast growing factory making general line of steel stampings. Located in good mid-western city, runs about thirty punch presses, with full supplemental equipment, employs seventy operatives. Must be first class executive, good disciplinarian, able to handle labor and to turn out the work. Only thoroughly equipped and experienced man need apply. Place demands a good man and will pay for him, but wants full value received. No beginners or failures wanted, but the chance of a lifetime for the right man. State fully and clearly your qualifications, experience, age, and salary desired. All will be held strictly confidential. Address X 231, care MACHINERY, 49 Lafayette St., New York.

WANTED AT ONCE.—MECHANICAL DRAFTSMAN FOR CRANES. One with experience on Structural work preferred. State salary and experience. SPRAGUE ELECTRIC WORKS, Bloomfield, N. J.

RECLAIMING SCRAP

Turning Worthless Scrap-Iron to Positive Profit-Value

Is not only an imperative duty to every manufacturer, but it is the merest common sense for the most

REASONABLE ECONOMY

Scrap merely commands the low price, when selling it for scrap, that will enable the other fellow to make an assured profit on it—and often that same scrap is re-sold, passing thru two or more hands and all making a profit.

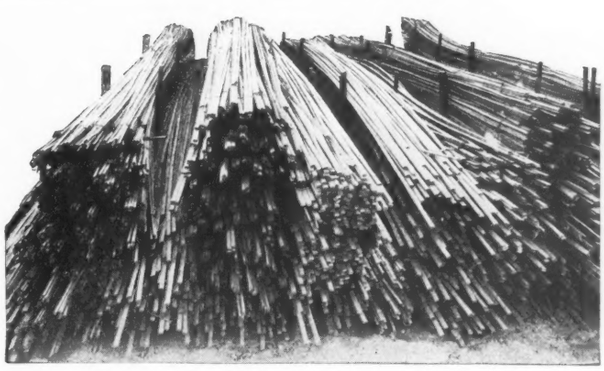
AJAX Reclaiming Rolls

Make it just as easy for you as for the other fellow to convert all that same scrap you are selling for a mere song into high-class finished bars—in your own plant. You thus get full value from all your raw product, and without a particle of waste.

WHAT YOU SAVE ON YOUR SCRAP IN A YEAR
would pay for several AJAX RECLAIMING ROLLS to last a life-time

They reduce your scrap to either Flat, Square, or Round Sections, as you may desire. They are fitted thruout with Cut Gears and Pinions, Massive Housings, Phosphor-Bronze Bushings, and the Ajax Improved Oiling System.

These AJAX Reclaiming Rolls are the latest development in Light Rolling Mill Engineering Design. They are of the three-high roll type, with full adjustments.



NOW BEING USED AND ENDORSED BY LEADING RAILROADS AND SHOPS AS THE GREATEST ECONOMIC EQUIPMENT EVER DEVISED

Write us for full description, prices, and particulars, and let us tell you just what they will save you.

The Ajax Manufacturing Co.
3800 Lakeside Avenue, CLEVELAND, OHIO

A STARTLING EXAMPLE OF MANUFACTURING ECONOMY

Accomplished on a GARDNER DISC GRINDER

READ TEST REPORT OF THIS JOB

The Old Way

Here are a lot of cast iron Box Caps, it being required to face off under side straight and clean. These pieces were formerly cast solid, i. e., the face of these caps was not recessed to make a smaller surface area as shown in cut. Formerly there were two unbroken surfaces, 8″ long by 2¼ wide (a total of 36 square inches) to be machined, and the operation was done on a milling machine. About ¼″ stock was left for "finish." Each piece then weighed 23 pounds. The cost of milling operation, plus 150% for shop burden, was 8 cents each, and, together with cost of casting, made a piece cost of 71 cents each. Milling machine output was 10 pieces per hour.

The Gardner Grinder Way

The pattern was changed so as to leave a ¼″ rib extending around all edges and bolt holes. Only $\frac{1}{32}$″ stock was left for disc grinder "finish." This reduced surface area to 14 square inches. saved 8 cents worth of cast iron and made this surfacing operation a "Gardner Grinder" job.

By changing pattern, each casting then weighed 20 pounds. The cost of Disc Grinding operation, plus 150% for shop burden, was one cent (1c.) each, and together with cost of casting made a piece cost of 56 cents each. Gardner Grinder output was 60 pieces per hour.

This means a saving of 15 cents on every finished piece and an increased output of 6 to 1.

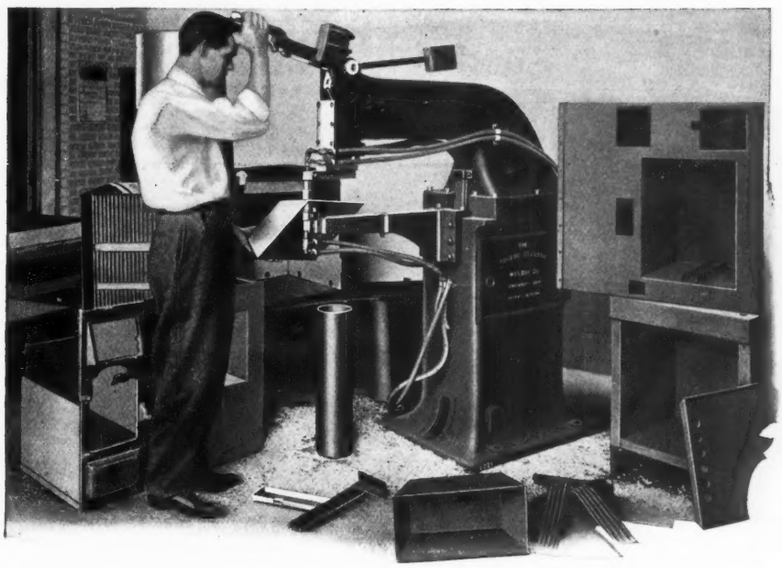
This is only one of the hundreds of cases where Gardner Disc Grinders have effected savings of from 10% to 100%, and increased outputs from 2 to 20 times. Address our Experimental Department for figures on your work.

Ask for Disc Grinder literature. We make the largest, most complete and reliable line of disc grinding machinery in the world.

GARDNER MACHINE COMPANY
Beloit (The Disc Grinding Authorities) **Wisconsin**

It's an Electric Spot Welder

No Holes To Punch No Rivets Used



Welding sheet iron pans—8 welds per pan—6 pans per minute
Average 300 per hour

HOW? He places the pan between the copper die points and pulls down on the lever handle which forces the die points together—then touches the switch with his thumb. Let go!! IT'S FINISHED. ¼ second is all the time required to fuse or melt the metal at that point. And, if you'll give us a chance, we'll *prove* it's 60% stronger than a rivet.

THE COST? If your current costs 5c. per K.W., and you are using 20 gauge stock, it will cost for current 10c. per 1,000 welds.

Suppose he makes 20,000 welds per day—current will cost **2.00**
Boy's time per day **1.75**
3.75

Can you punch holes, buy rivets, and insert them for this price? Can you make as good and neat a job?

THE PRICE? This particular 27″ throat machine, complete with regulator—water cooled dies—swiveled head and all attachments, ready to connect to the wires from your power station—**$700.00.** If you give us the chance, we'll tell you why it's worth it. Welds ⅛″ to ⅛″ or 30 gauge equally as well. This is only one out of 60 different types of spot and butt welding machines ranging in price from $300 00 to $10,000.00, depending on the size and kind of work they are to do.

We have never been accused of building *cheap* machines. *There's a reason.* Welding machines are our specialty and we can't afford to build *poor* ones. You can get a suit of clothes for $4.00, or a better one for $30.00, and we'll bet a welder against a doughnut with a hole in it that the average reader of this don't wear the $4.00 kind. Why? ON ACCOUNT OF THE REASON.

Our Sheet Metal Worker's Hand Book tells all about it and it's yours for the asking.

NO LEASE NO LICENSE NO ROYALTY
And Protection Guaranteed Against Patent Suits

The Toledo Electric Welder Company

Langland and Knowlton Streets CINCINNATI, OHIO, U. S. A.

98 Holes Per Hour on a Sibley Hi-Speed over 73 Holes Per Hour on Cone Driven Drill Presses

A plow beam is one of the most difficult pieces to drill. Being made up of very tough steel, seldom uniform in composition, and with unskilled labor operating on a piece-work basis, only the sturdiest machines will stand up under the strain.

30 Hi-Speeds in this Plant

Sibley Machine Tool Company

No. 8 Tutt Street South Bend, Ind., U. S. A.

SUPERIOR

High Speed Drilling Machine

28, 32 and 36-inch
WITH POSITIVE GEARED FEED

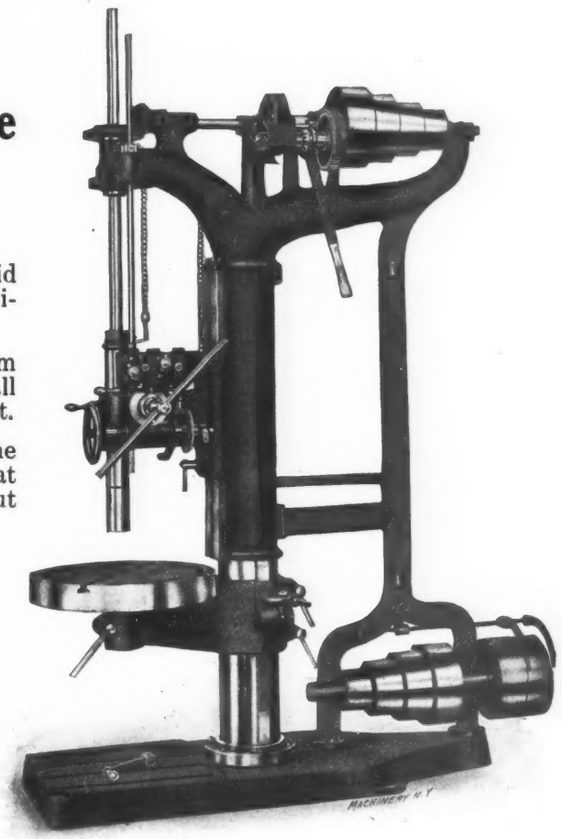
These machines are of the most powerful and rigid design and equipped to insure the greatest convenience in handling.

The base and table are heavily reinforced, table arm and head have long bearing on the column and all shafts and spindles are ground to insure a perfect fit.

The geared feed box, located on the head of the machine, has all gears of 3½% nickel steel, heat treated, and provides four changes of feed without stopping the machine.

The Patent Tapping Attachment, furnished with all our machines when desired, has all steel gears and is the most powerful device of its kind.

Full particulars and circulars on request.



Superior Machine Tool Co.

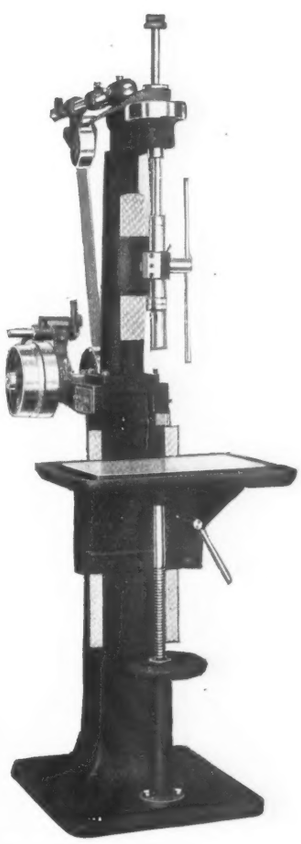
KOKOMO, IND.

More Popular than Ever

Thousands of Henry & Wright Drilling Machines are now in use all over the world—and we're taking more orders and making more shipments every day.

There is good reason for this demand—you can always find reasons for a thoroughly good machine. Interchangeable ball bearings reduce friction to the minimum, thereby lengthening the life of the machine; the simple belt system permits the correct drill speed to be maintained at all times, prevents power loss from slack belts, and transmits all the power that enters the machine direct to the drill point. In the new model machines, greater rigidity, wider range, greater overhang, larger tables and other special features commend Henry & Wright Ball Bearing Drilling Machines to careful buyers.

May we send you a catalog? Shows full line.



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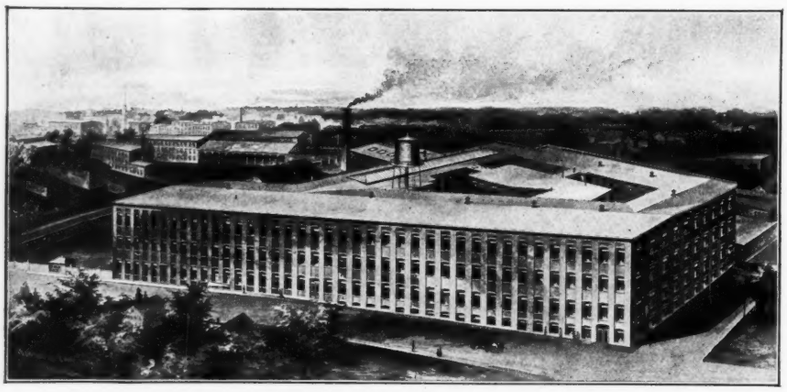
HARTFORD, CONN., U. S. A.

Our Entire Facilities are Devoted to Contract Work



Our acres of floor space, unequaled machine equipment, special facilities for handling difficult work, skilled and specialized workmen—are yours to command.

Designing and Making Special Tools and Machinery

has been an important part of our business for years.

We are contract manufacturers on a scale that permits of the closest economy in production. We can save you trouble and money—design your tools—make them complete—and use them in the manufacture of your machines if you so desire.

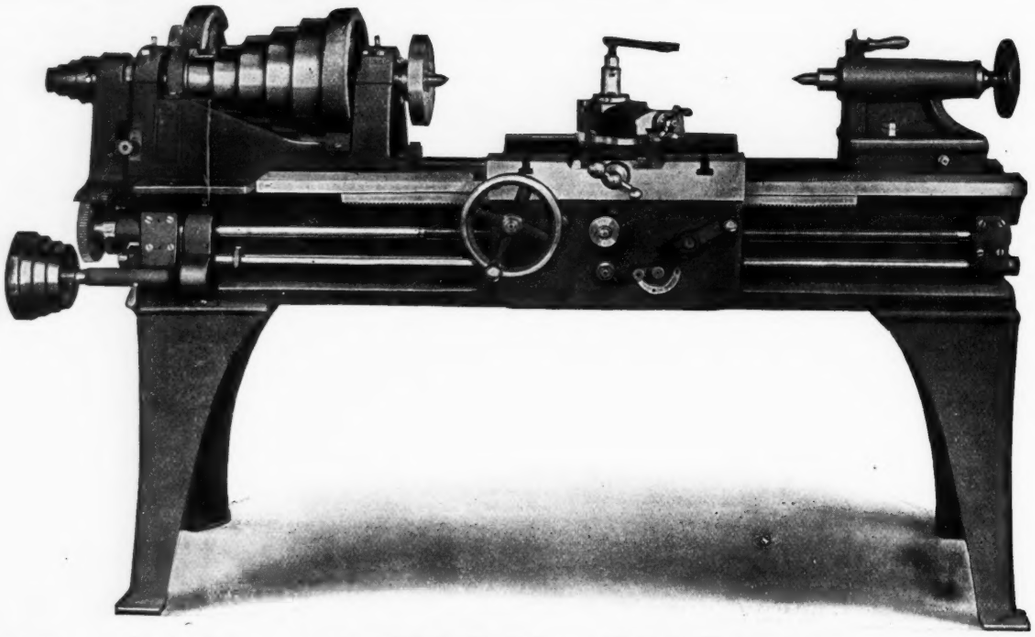
May we receive specifications covering your requirements in our line?

Department C for full information.

THE TAFT-PEIRCE MANUFACTURING COMPANY

WOONSOCKET — Contract Manufacturers, Mechanical Engineers and Designers of Special Tools and Machinery — RHODE ISLAND

Western Office: 1311 Majestic Building, Detroit, Mich.



THE R-T 15-INCH ENGINE LATHE

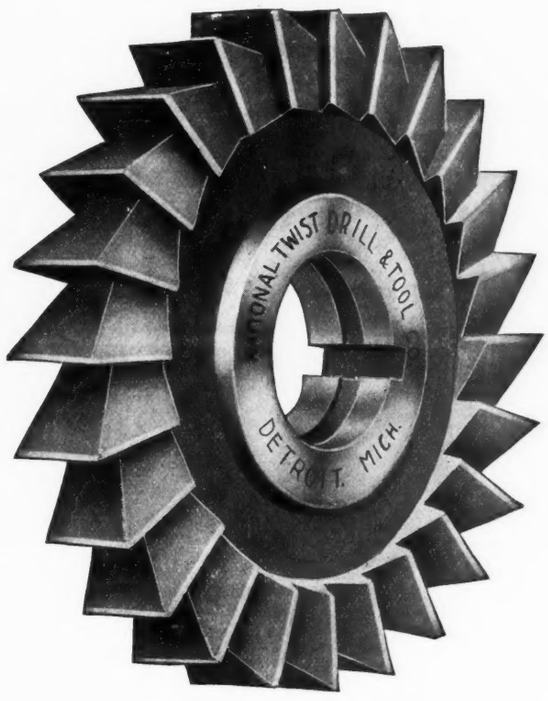
A High Grade Tool for manufacturing and tool room requirements, convenient of operation and supplied with latest improved attachments.

Specifications will be found to agree with the best accepted practice in design, material and workmanship. *Glad to send particulars.*

ROCKFORD TOOL CO., Rockford, Ill.

HARRISON AVENUE AND ELEVENTH STREET

Every Tool Guaranteed



Special High Speed List on Request

See that your Milling Cutters carry the National Detroit Trade Mark

If you are handling high grade work, our High Speed Steel Cutters will more than double the speed, give fifty per cent. longer service than carbon cutters, and permit you to increase the table travel to the full limit of the machine.

We have made the word **"National"** on a tool a synonym for quality, uniformity and durability.

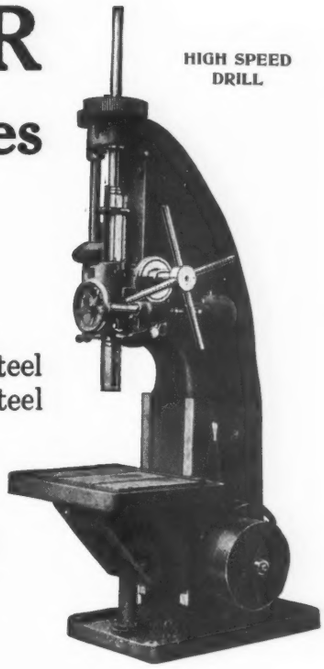
We specialize on high speed steel tools; carry a full stock of Cutters, Twist Drills and Reamers on hand, or can furnish them to your specifications.

National Twist Drill & Tool Co.
DETROIT, MICH., U. S. A.

OVER 1000 BAKER
High Speed Drilling Machines

in use, substantiate our claim to the most efficient High Speed Drill yet produced.

HIGH SPEED DRILL



Capacity of our Machines:

Standard Pattern ½" to 2½" in steel
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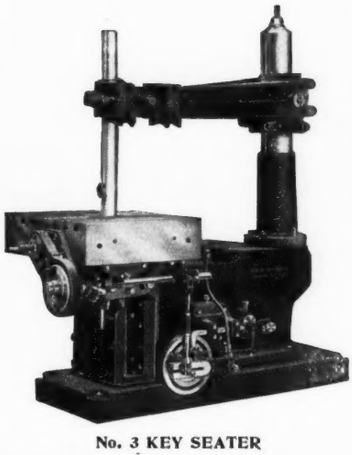
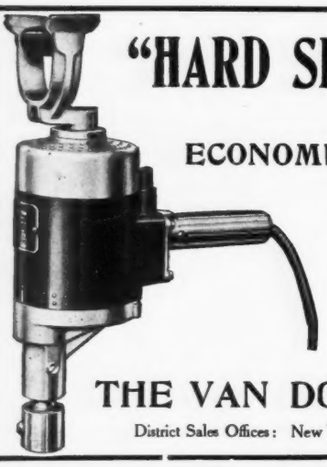


No. 3 KEY SEATER

If you want bigger, better results in Drilling, Boring, Tapping, Facing, Forming or Keyseating, send for our catalog and special information.

We have the machine and can insure efficient results.

BAKER BROTHERS, Toledo, O.



"HARD SERVICE" Electrically Operated DRILLS and REAMERS

Built in 6 sizes. Scope 0 - 2 inches

ECONOMICAL EFFICIENT DEPENDABLE

Are you operating to the best advantage? The drilling operation in connection with your assembly and large and heavy parts can be greatly simplified by taking a machine to your work instead of the work to a machine. "Hard Service" (PORTABLE) electrically operated Drills and Reamers are the solution of the problem. YOU save both time and power. Attach the drill cable to a lamp socket and you are ready for work.

Write for descriptive matter, information and prices.

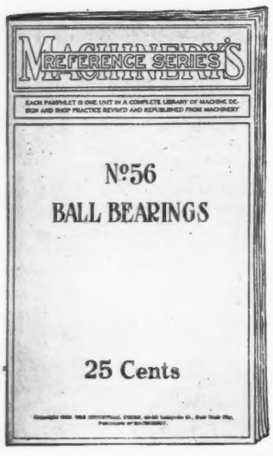
PORTABLE TOOL DEPARTMENT

THE VAN DORN & DUTTON CO., CLEVELAND (Sixth City)

District Sales Offices: New York, Chicago, Pittsburgh, Detroit, San Francisco, St. Louis. R. E. T. PRINGLE, Windsor, Canadian Representative.

BALL BEARINGS

No. 56 in MACHINERY'S Reference Series



The subject of Ball Bearings is one which has always been of interest to mechanics. In ordinary text books there is comparatively little to be found on ball bearings, and this Reference Series Book gives more practical information on the subject than any other publication we know of.

THE INDUSTRIAL PRESS

49-55 Lafayette Street New York, N. Y.

BENCH LEGS

THAT MEET REQUIREMENTS

Particularly advantageous for use in modern shops because they can be placed in the middle of the room, or elsewhere, and give a stiff, rigid support independent of walls. Adjustable to varying factory conditions, being capable of change of location without loss or damage, forming a basis for underneath shelf and bin construction.

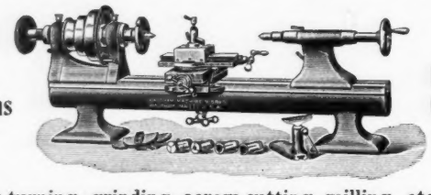
Get our catalogue of shop specialties.

The New Britain Machine Co.

New Britain, Conn., U. S. A.

"Waltham" Precision Bench Lathes

New Designs



Best Quality

For turning, grinding, screw cutting, milling, etc. Swing 8 inches, have large chuck capacity, a light running spindle, and are complete in every detail.

Also builders of Automatic Pinion and Gear Cutting Machines.

Catalog on request.

Waltham Machine Works

Newton Street, Waltham, Mass.

SEND US YOUR DIE WORK

We make a specialty of Blanking, Piercing, Trimming and Forming Dies—the highest grade dies and dies of closest accuracy.

We are also experts in Special Tools, Jigs and Fixtures, first class tool-room work of all kinds.

We prefer work that calls for the closest limits of tolerance and with our equipment and experience at your service, can save money and assure the best results.

Send blue prints or drawings for estimates.

The Columbus Die, Tool & Machine Co.

COLUMBUS, OHIO

DON'T STOP

The Owen

Miller to change feeds—you can get 32 of them **while the machine is running.** Cuts can be taken at high speed without vibration and the power, accuracy, and rigidity of these Millers are remarkable.

Full particulars on request.

Book of testimonials now ready.

The Owen Machine Tool Co.

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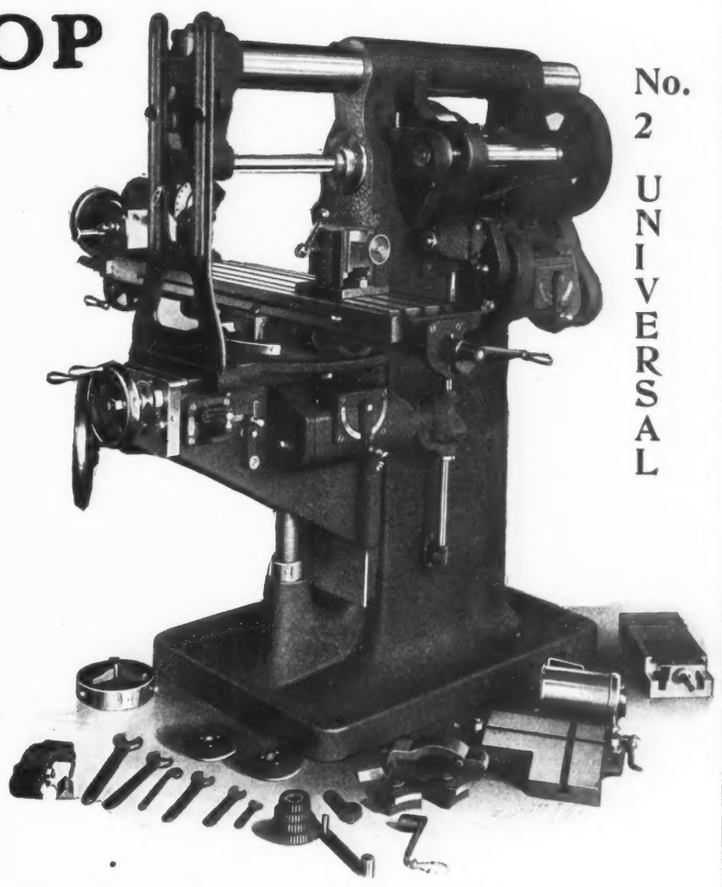
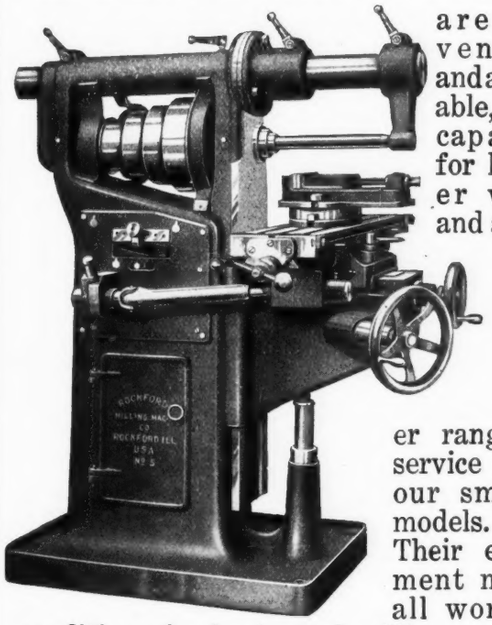


No. 2 UNIVERSAL

NEW ROCKFORD MILLING MACHINES



are convenient and adaptable, with capacity for heavier work and a wider range of service than our smaller models. Their equipment meets all working conditions for horizontal milling, vertical milling and slotting.

Send for the new circular.

Rockford Milling Machine Co.

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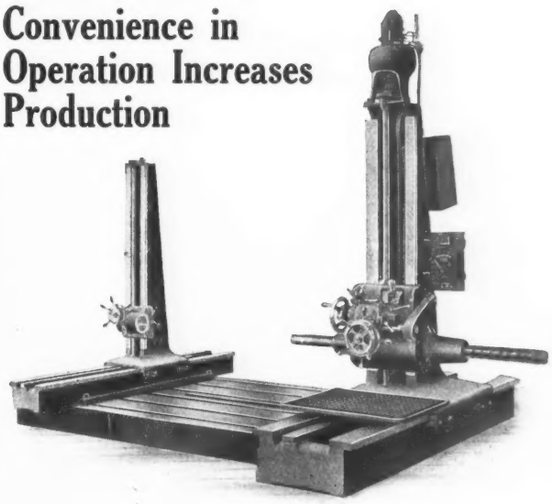
Convenience in Operation Increases Production



ROCHESTER Boring, Drilling and Milling Machines

are so designed that the operator can instantly obtain any desired speed, feed or traverse in any direction from one position convenient to his work. Rapid power traverse in all directions is also provided, and the largest number of machine operations, including boring, drilling, milling and tapping, can all be performed at one chucking of the work.

There are other "Rochester" points we'll be glad to explain, if you will write us.

Rochester Boring Machine Company

ROCHESTER, NEW YORK, U. S. A.

250 Watt Bowl ABolite

ABOLITES SCIENTIFIC INDUSTRIAL ILLUMINATION

In equipping his plant, the modern industrial manager spares no expense in the purchase of up-to-date tools and machinery.

But how about the lighting of the plant? Too often it is given only passing consideration and very frequently is entirely overlooked. It is considered as incidental—as a matter of secondary importance.

This conception of industrial lighting is wrong. We must realize that light is a tool—a tool by which all other tools are run.

In specifying machinery, an efficient lighting system should always be included, because it will prove the most important and useful machine in the entire plant.

The ABolite

is representative of the best available in efficient scientific lighting units. The Abolite has seven distinct advantages over any system now in vogue. It furnishes a means of scientific illumination at a cost so reasonable that no progressive industrial manager can afford to pass it by.

Our investigations show that the loss in quality and quantity of output in 60% of the industrial plants of the United States, due to poor lighting, is sufficient to pay annual dividends on the capital stock of the Company.

All we ask is the opportunity to show you that the ABolite can not only save you money, but that it will earn greater dividends on its first cost of installation and maintenance than any other machine in your plant.

A-B Efficiency Engineering

A department of Efficiency Engineering has been added to our commercial organization for the purpose of studying conditions and co-operating with industrial managers in bringing their illumination to a plane where labor efficiency and factory output will be greatly increased. The work of this department is part of the general efficiency movement just launched, and we feel that the initiative taken by this Company in the establishment of such a department will do much toward improving general industrial lighting conditions.

Write us your conditions; we can help you. May we send you loose-leaf catalogue describing the ABolite line in detail?

The Adams-Bagnall Electric Co.

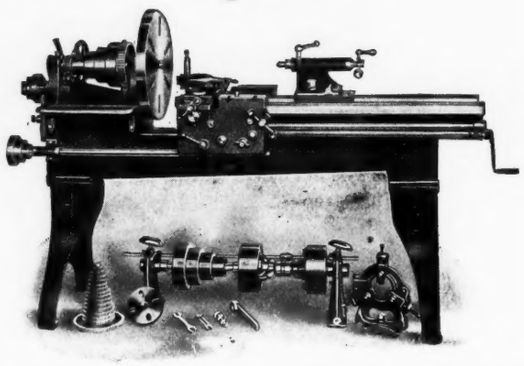
CLEVELAND

New York Philadelphia Pittsburg Syracuse Chicago Atlanta

R. E. T. PRINGLE, Canadian Representative

Head Office: Windsor, Ont. Branches: Montreal, Toronto, Winnipeg.

13-22 inch Sliding Extension Gap Lathe



The advantages of the Sliding Gap Feature of this Lathe are apparent. It not only increases the swing of the lathe and the distance between centers, but permits the width of the gap to be varied to suit requirements of the work.

The Lathe has the strength and the power to turn full diameter of swing in the gap, and, at the same time, it is free from any awkward features for use on ordinary work when gap is closed.

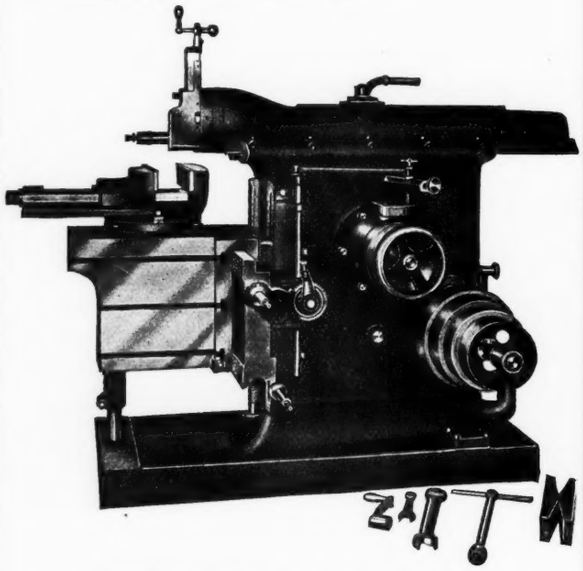
A line to us will bring you descriptive bulletin "M" and prices.

BARNES DRILL CO., Incorporated —1907—

830 Chestnut Street ROCKFORD, ILL.

The Strength and Rigidity of "Milwaukee" Crank Shapers

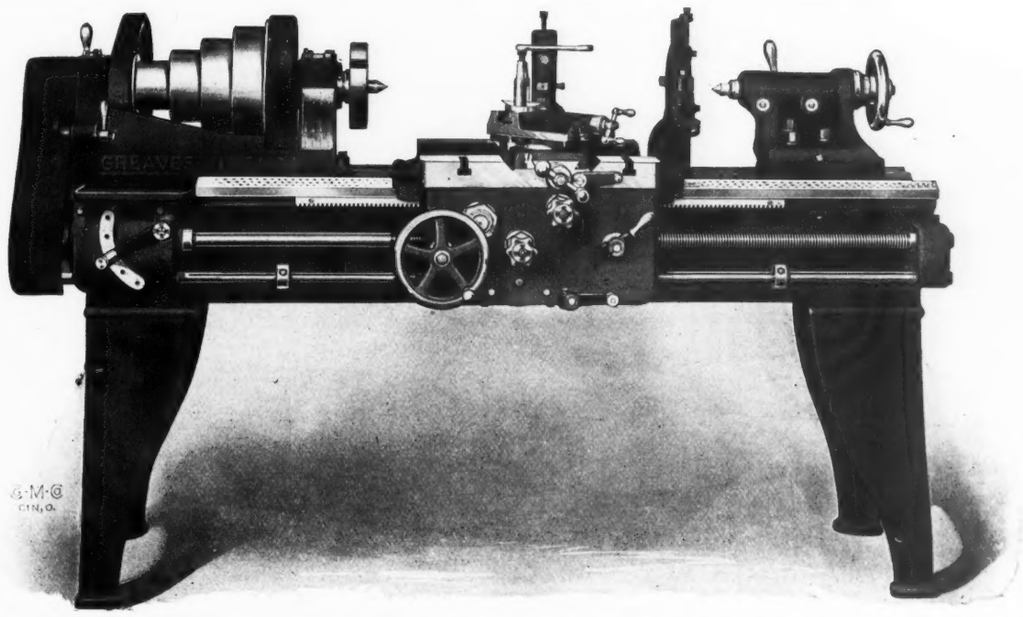
is second only to their convenience—three production factors of fundamental importance in shaper construction. We do not claim everything for these machines, but their ability is the good old-fashioned kind that gets things done accurately, quickly and economically. *Want to know them?*



Two sizes, 16" and 24". Send for our Catalog.

LUTTER & GIES CO., Milwaukee, Wis.

AGENTS—E. L. Essley Machinery Co., Chicago. O. L. Packard Machinery Co., Milwaukee. Compressed Air Machinery Co., San Francisco, Cal.



Unusual construction gives exceptional driving power to the new Greaves-Klusman 15" Engine Lathe.

One of the features of our new 15" Heavy Standard Engine Lathe is the relative positions of the center line of the bed. and that between the head and tailstocks. The center line of the latter is placed back of that of the bed, and this does away with the overhang of the tool when turning large diameters. This form of construction also admits a deep web between the headstock housings, and permits the use of a cone pulley of large diameter, giving this lathe its exceptional driving power. *Write for full particulars.*

GREAVES, KLUSMAN & CO., Cincinnati, Ohio.

TOOL CASES

DRAFTSMEN

You probably have more instruments than can be placed in the small case which contained your first set, and yet you certainly desire to keep them all together. We have a tool case in which you can keep all your instruments, pencils, note book, etc., under lock and key, where they will not be injured or meddled with.

TOOL MAKERS

You will find our tool maker's case the very thing you need. It is strongly constructed and nicely finished, has felt-lined drawers, brass handles and a strap handle which makes it easily carried.

MACHINISTS

Don't have a tool box made to order and pay two prices for it. Our tool case for machinists will surely please you.

Write for descriptive matter and prices.

The Ohio-National Mfg. Company
CHILLICOTHE, OHIO, U. S. A.

THE COATES

has a place in every shop and in every part of the shop. Can be taken anywhere, twisted into any position, and, with its interchangeable fixtures for various operations, can be used in the sharpest kind of corner or the smallest hole you can get into.

It will grind, drill, polish—is adaptable for a host of jobs on which no other type of tool could be as profitably operated. Saves moving heavy work to drill press or grinder and allows one man to do the work which formerly required five or six to simply set the piece in position for working.

Let us explain—"Coates" book is worth your attention.

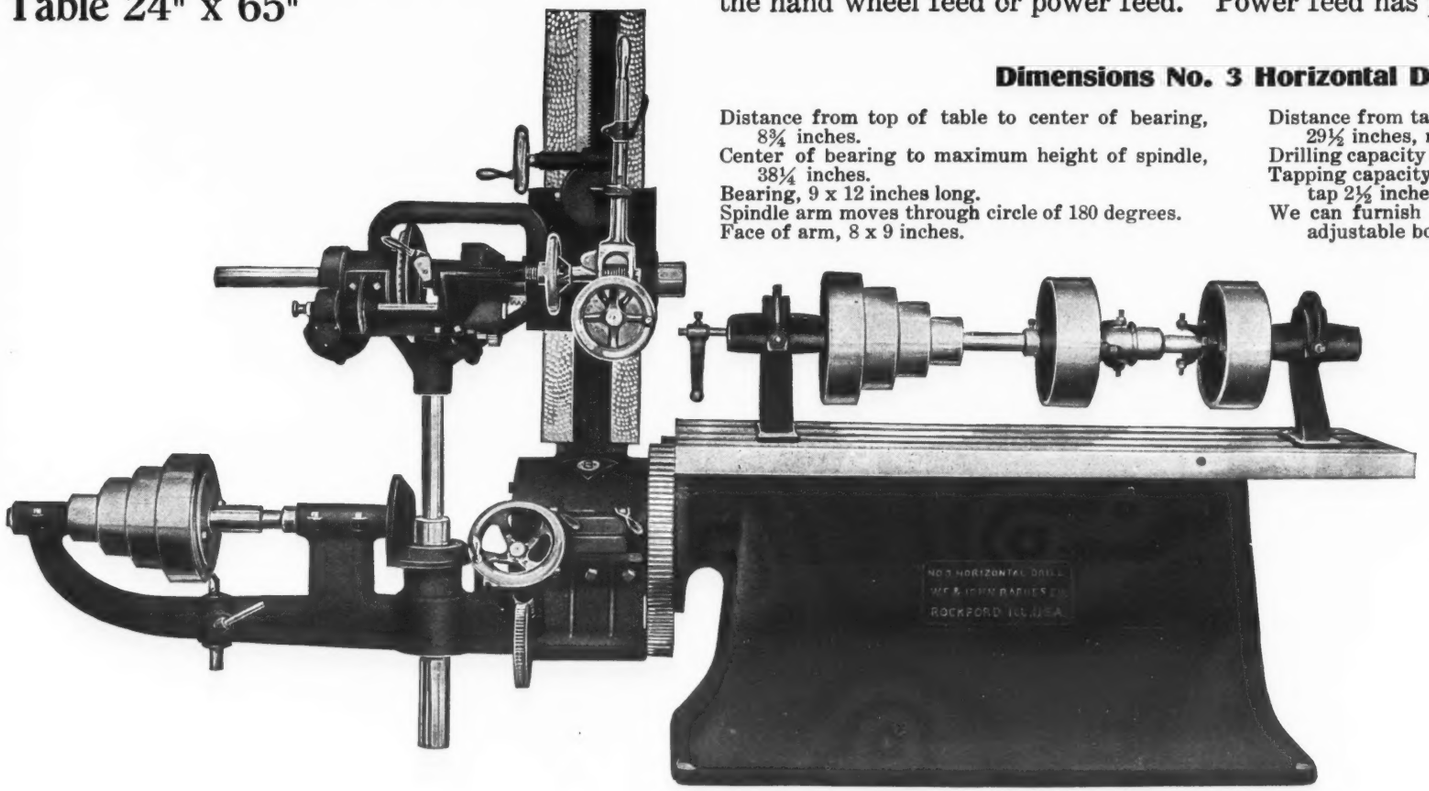
¼ to 100 horsepower—as you need.
Indispensable in repair and machine shops.

Coates Clipper Manufacturing Co.
Worcester, Mass., U. S. A.

BARNES RADIAL DRILL

Spindle travel 18 inches
No. 4 taper hole in spindle
Weight 3,300 lbs.
Table 24" x 65"

WE illustrate herewith a No. 3 Horizontal Radial Drill or End Drilling and Tapping Machine. The machine is back geared, strong and well-built and all parts are within easy reach of the operator. The table is slotted for holding the work; the arm is of heavy box pattern, and the sliding head is gibbed strongly on the square ways of the arm. For operating the spindle, the operator has choice of three feeds; namely, the lever feed or the hand wheel feed or power feed. Power feed has positive drive.



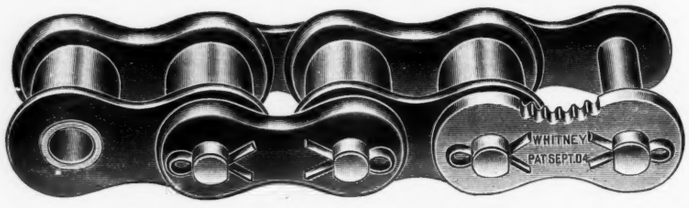
Dimensions No. 3 Horizontal Drill:

Distance from top of table to center of bearing, 8¾ inches.
Center of bearing to maximum height of spindle, 38¼ inches.
Bearing, 9 x 12 inches long.
Spindle arm moves through circle of 180 degrees.
Face of arm, 8 x 9 inches.
Distance from table to center of spindle, maximum 29½ inches, minimum 2⅜ inches.
Drilling capacity in solid C. I. 3 inches, Steel 2 inches.
Tapping capacity in C. I. 3 inches; Capacity of pipe tap 2½ inches.
We can furnish Arbor Rest (extra cost) which is adjustable both vertically and horizontally.

W. F. and John Barnes Co.

231 Ruby St., Rockford, Illinois

FOREIGN AGENTS:
Fenwick Freres & Co. - - - Paris.
Chas. Churchill & Co. - - London.
Heinrich Dreyer - - - - Berlin.
F. W. Horne - - - Yokohama.



"Whitney" High Grade Driving Chains

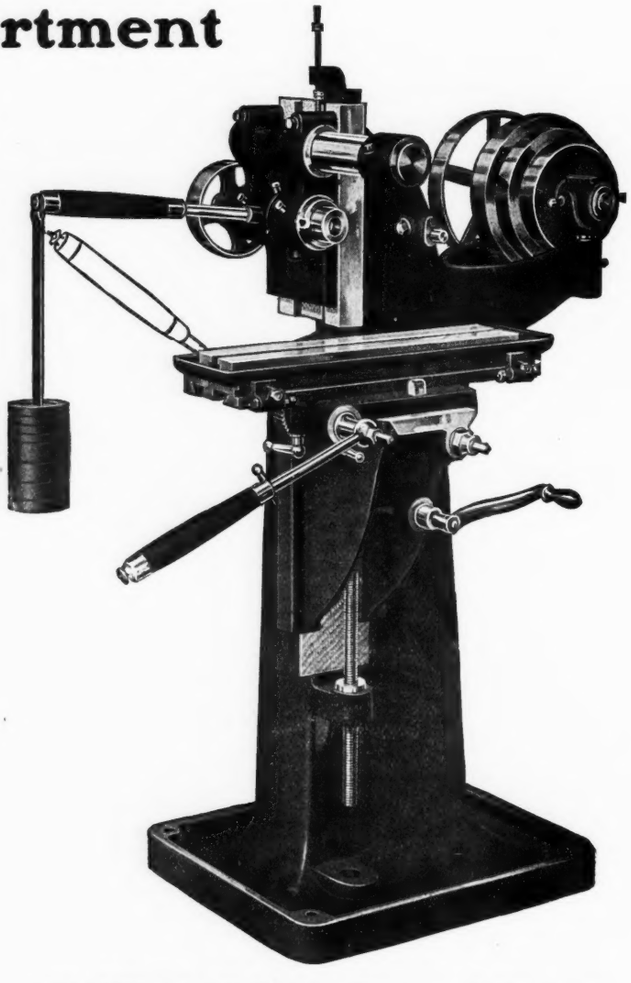
Roller Chains—Block Chains—Quiet Chains—Chain Belts

We build chains for all kinds of power transmission.
Send us your requirements.

Machine Department

"Whitney" Hand Millers

are known the world over for their wide range of work. Thousands of milling operations are being made on expensive power (feed) milling machines that could be done quicker and to better advantage on this Hand and Weight (feed) Miller costing half the money. A number of individual customers are operating over 100 of these tools and the variety of work produced on same would surprise you. We make more of a specialty of Hand Millers than any other company in the world.

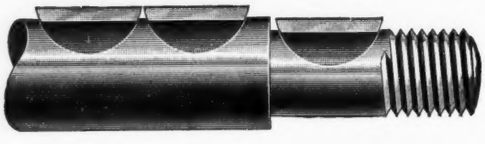


"WHITNEY"
20-inch Water Tool Grinder

Has no pump, piping or packed joints to get out of order.

Water pan inside of base supplies water to wheel by means of lever, rack and pinion. Water pan can be easily removed for cleaning.

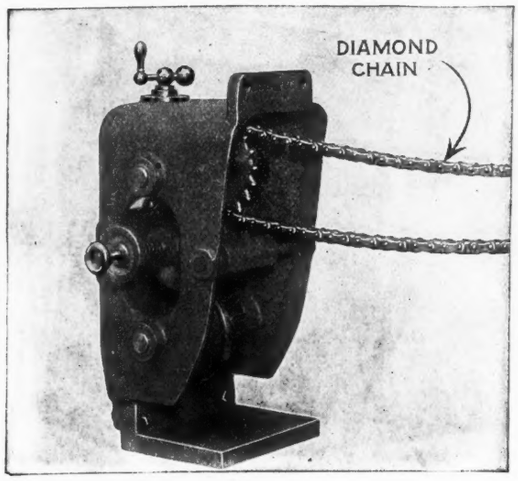
"The" Woodruff Patent System of Keying"



Will cut down your costs. Ask the users.

THE WHITNEY MFG. CO., Hartford, Conn.

FOREIGN AGENTS—C. W. Burton, Griffiths & Co., London. Fenwick Freres & Co., Paris. F. G. Kretschmer & Co., Frankfurt a/M., Germany.



This Diamond Chain drive works better and costs less than gears.

The Diamond Chain and Sprockets on the feed box of the Lea Simplex Cold Metal Saw, as shown above, replaces four mitre gears and shaft. Comparing the two driving methods, the Lea Equipment Co., manufacturers of this tool, tell us that the gear drive was extremely expensive and noisy and, as the shaft had three bearings, alignment was a very tedious job. The chain and sprockets cost much less, and have done away with the noise. The flexibility of the chain drive makes assembling easy, and the **rolling** of the chain into mesh, in contrast to the **grinding** action of gear teeth, affords a decided power saving.

Diamond Chains, within proper limitations, are often more practical than spur or bevel gearing or short belts. And this is a matter that can usually be figured out pretty accurately in advance. If you have any troublesome short, slow or medium speed transmissions, it will pay you to get the free advice of our engineers.

Write for book, "Power Chains and Sprockets."

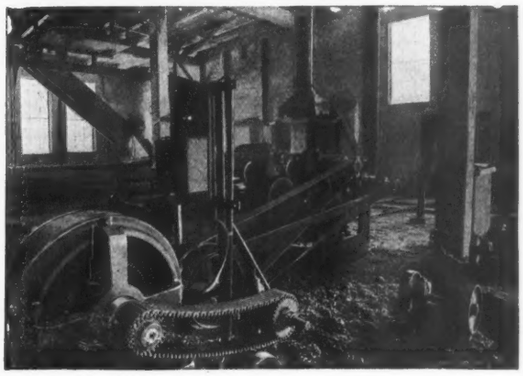
TRADE ◇ MARK

THE DIAMOND CHAIN & MANUFACTURING CO.

240 W. Georgia Street, Indianapolis, Ind.

Capacity 8,000,000 Feet Per Year

97



30 h. p. Morse Silent Chain driving Matcher in Wood Working Plant.

99 + 1

PROBABLY ninety-nine of the reasons advanced advocating chain drive are applicable to more than one make of chain.

The one hundredth reason is applicable to only one; it is an exclusive feature of

The Morse Silent Chain

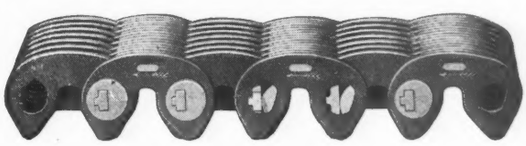
No other chain has a joint like the Morse Chain; no other chain is free from wear at this point; no other chain has the long life this joint gives a chain.

The *Rocker-Joint* of the Morse Chain eliminates friction and reduces wear to a minimum. It is built on a principle new to chain construction. A knowledge of how it works will convince any practical mechanic of its superiority.

To be able, when called upon, to specify the most durable and efficient driving chain, send for our Catalogue No. 9 today.

Morse Chain Co.

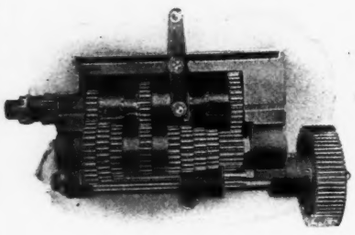
Ithaca, New York

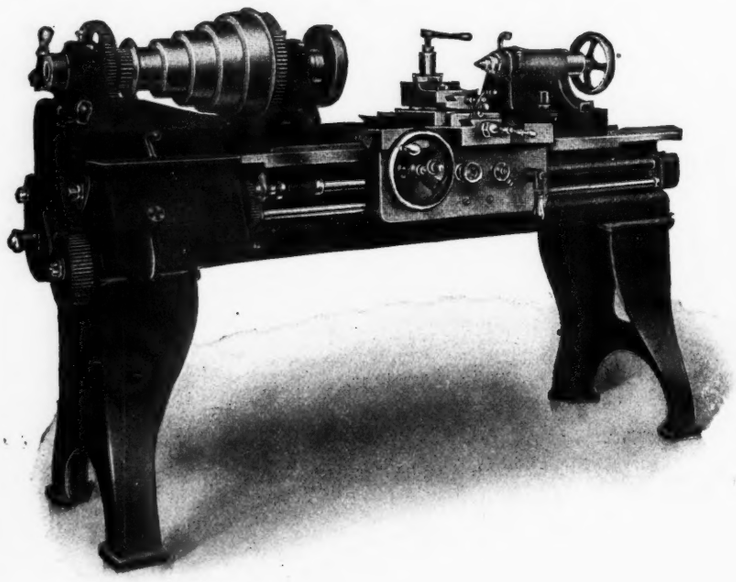


The Flather Quick Change Gear Lathe

Latest and Best.
Strong and Simple.
Least number of Gears.
Greatest number of Threads and Feeds.

Send for descriptive circular.

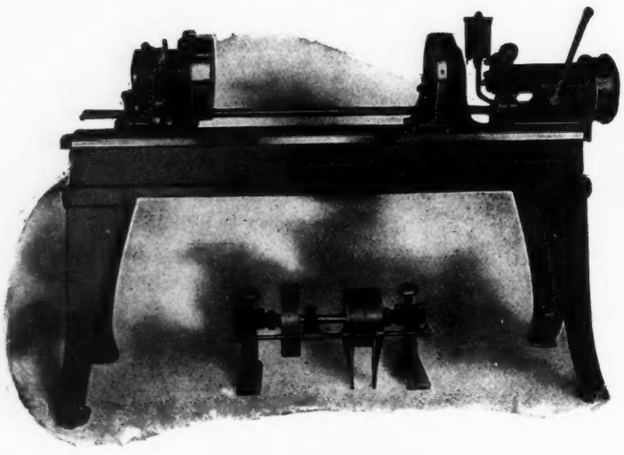




Flather & Company, Incorporated, **Nashua, N.H.**

THE WHITON
Revolving Centering Machine

For Accurately Centering Finished Shafts



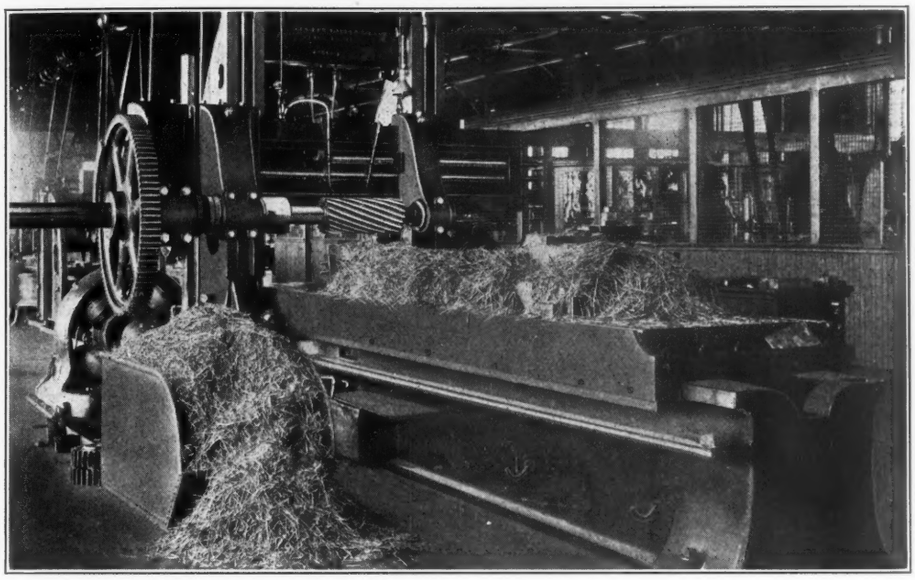
The cut shows new **Revolving Centering Machine**—a large size of the well known machine of this type. It is heavier throughout and has capacity to center shafts up to 5 inches in diameter.

Constructed same as the smaller machine and embodies all the special features.

Circulars and prices sent upon application.

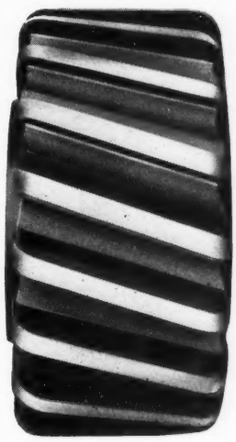
The D. E. Whiton Machine Company
New London, Connecticut

TAYLOR-NEWBOLD HIGH SPEED MILLING CUTTERS



SLABBING MILLS CHANNELING MILLS

By reason of their shape, the proper lip and clearance angles are maintained throughout the entire length of the blades, a feature that enables these cutters to remove more metal with the same amount of power required by other types of cutters, and whereby a strength is developed which taxes the capacities of modern high powered milling machines.

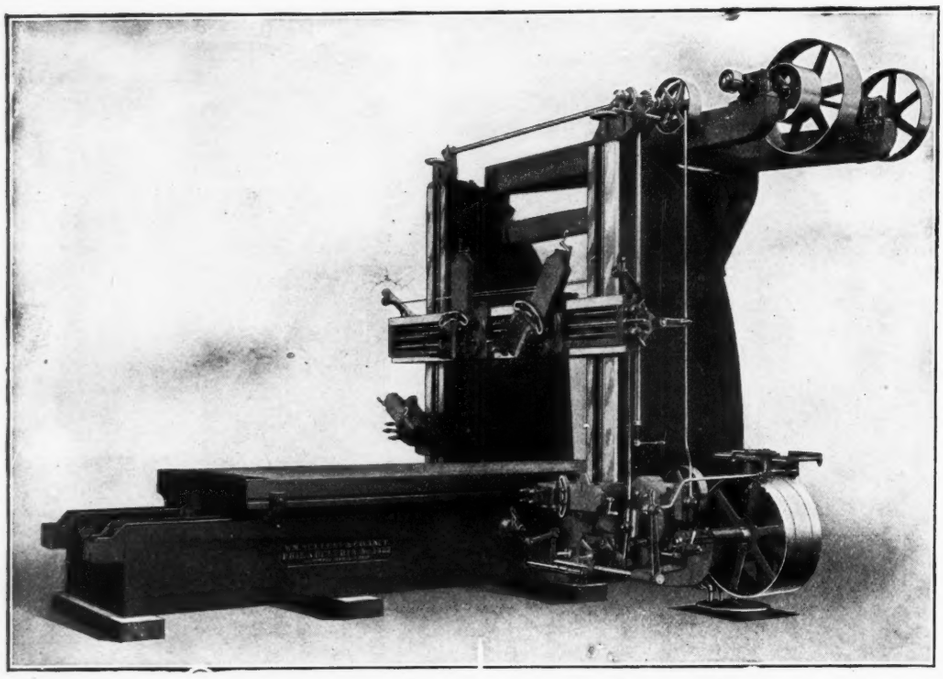


THE TABOR MFG. CO.

18TH AND HAMILTON STS., PHILADELPHIA, PA.

William Sellers & Co., Incorp., Philadelphia, Pa.

LABOR SAVING MACHINE TOOLS

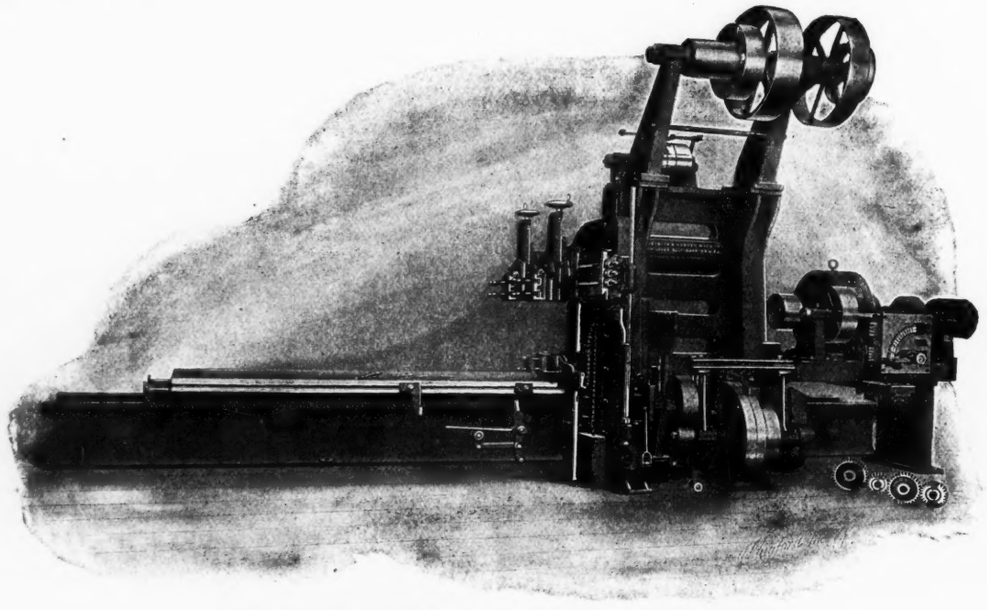


IMPROVED SHIFTING BELT PLANER

Table driven by our well-known spiral pinion, and stopped, started or reversed from either side. Crosshead extended back between uprights and bolted front and rear, raised and lowered by power, and stops automatically at top of uprights. Patent feed motion. Box uprights. Ways lubricated by power pump. All proportions greatly increased, especially bed and table.

Catalogue on application.

CRANES SHAFTING TURNTABLES INJECTORS Etc.



THE OPEN SIDE PLANER with Variable Speed Motor Drive.

Standard sizes: 30", 36", 42", 48", 60" and 72".

THE DETRICK & HARVEY MACHINE CO., Baltimore, Md.

Makers of

Horizontal Drilling, Boring and Milling Machines

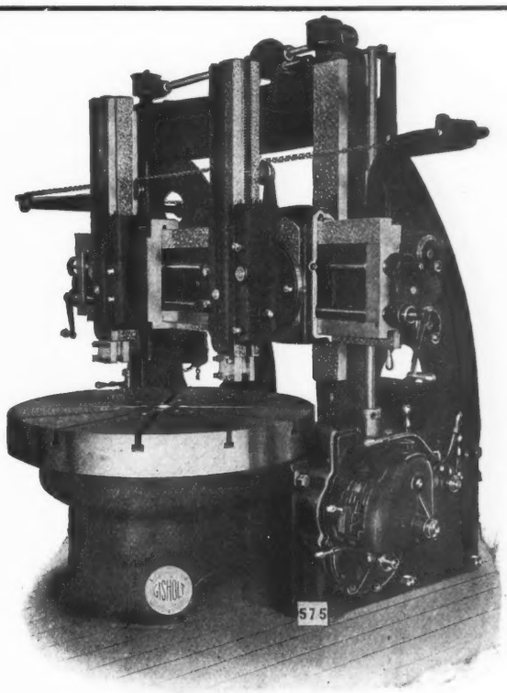
FOREIGN REPRESENTATIVES:—Ludw. Loewe & Co., Berlin, Germany. Paul Auriol, Paris, France. Wilh. Sonesson & Co., Malmo, Sweden. Chas. Churchill & Co., London, England.

GISHOLT BORING MILLS

Highest Degree of Accuracy
Widest Range of Use

Our experience has not only taught us requirements, but enabled us to build a Boring and Turning Mill that has taken precedence over all others, in the last ten years.

Constant control of both work and table; improved time and labor-saving devices; a wide range of feeds and speeds; micrometer index dials; automatic feed trips; safety frictions, and other special Gisholt advantages help to make Gisholt "full value" Mills.



Catalogs of Turret Lathes and Boring Mills mailed on request.

GISHOLT MACHINE COMPANY
MADISON, WISCONSIN

FOREIGN AGENTS:—Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Donauwerk Ernst Krause & Co., Vienna, Prague and Budapest. C. W. Burton, Griffiths & Co., London, England. Andrews & George, Yokohama, Japan.

JOSEPH T. RYERSON & SON
CHICAGO, ILLINOIS

Offices: New York, Chicago, Minneapolis, St. Louis, Pittsburgh, Milwaukee, Madison

We have been Making "CLEVELAND" OPEN SIDE PLANERS for the past Eight Years.

Bed, column and cross rail of Box Section Design. All gears removable from side except bull gear, which lifts out from top, and all gears in the drive, with the exception of the bull gear and its pinion, are enclosed and run in oil. Rack under table made of semi-steel. All machines have countershaft attached to top of column. Planers furnished parallel or right angle drive. Any size from 30" to 60"; any length. Simplicity, without sacrificing any movement or convenience, is our aim. Workmanship and facilities unexcelled.

Manufactured by

THE CLEVELAND PLANER WORKS
JAMES G. DORNBIRER
GEO. W. FORD
3150-3152 Superior Avenue
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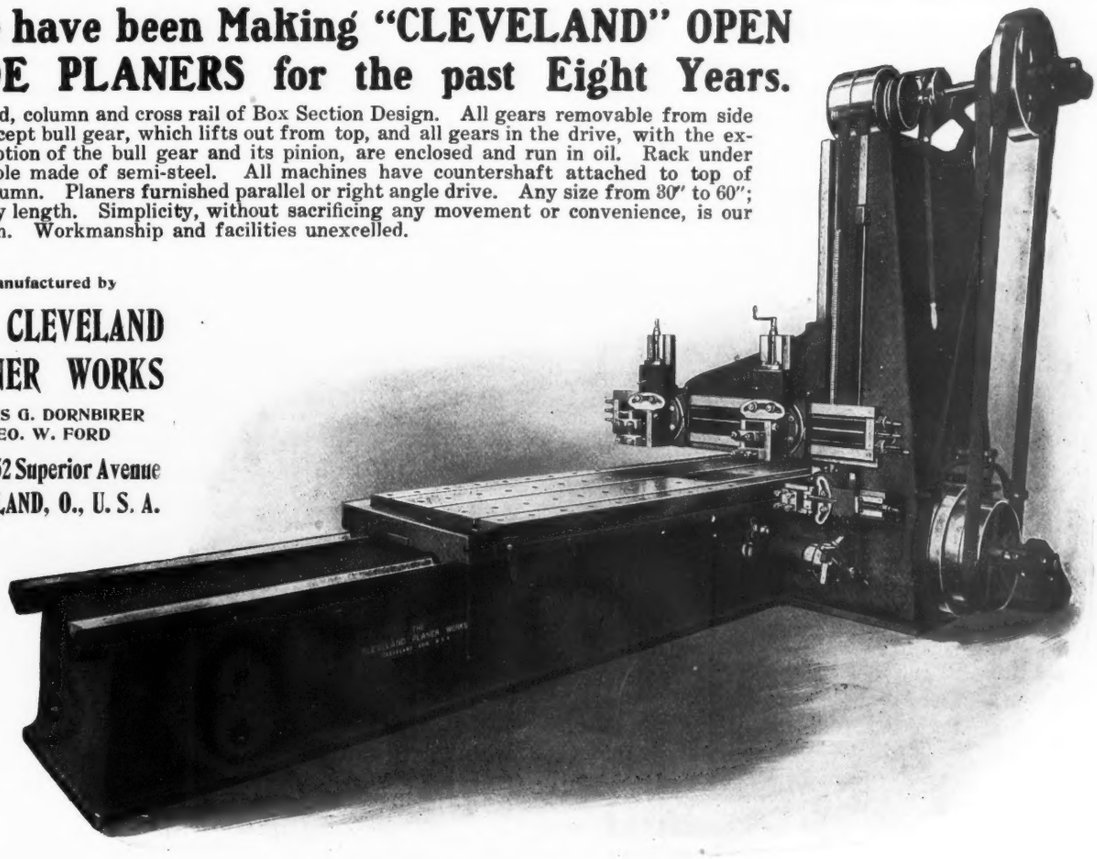
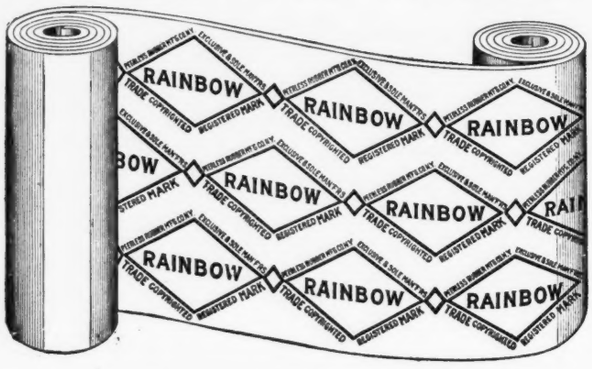


48-in. x 48-in.—16-ft. Planer.

Rainbow Packing

Makes Steam, Flange and Hot Water Joints Instantly.

Thousands of Imitations. No Equal. Will Hold Highest Pressure.



Don't have to use wire and cloth to hold Rainbow. Can't blow it out.

THE COLOR OF RAINBOW PACKING IS RED

Notice our Trade Mark of the word "RAINBOW" in a diamond in Black in

Three Rows of Diamonds extending throughout the entire length of each and every roll of Rainbow Packing.

WILL CARRY IN STOCK It is an undisputed fact that Rainbow Packing is the only Sheet or Flange Packing in the World that will carry in stock for months and years without hardening or cracking.

The Peerless Spiral Piston and Valve Rod Packing

Once Tried Always Used.

It will hold 400 lbs. of Steam.

Will run twelve months in high speed engines.

In Boxes 3 to 8 lbs.

Made in Three Different Shapes: Straight, Spiral and Square Spiral, in sizes from 1-4 inch to 2 inches.

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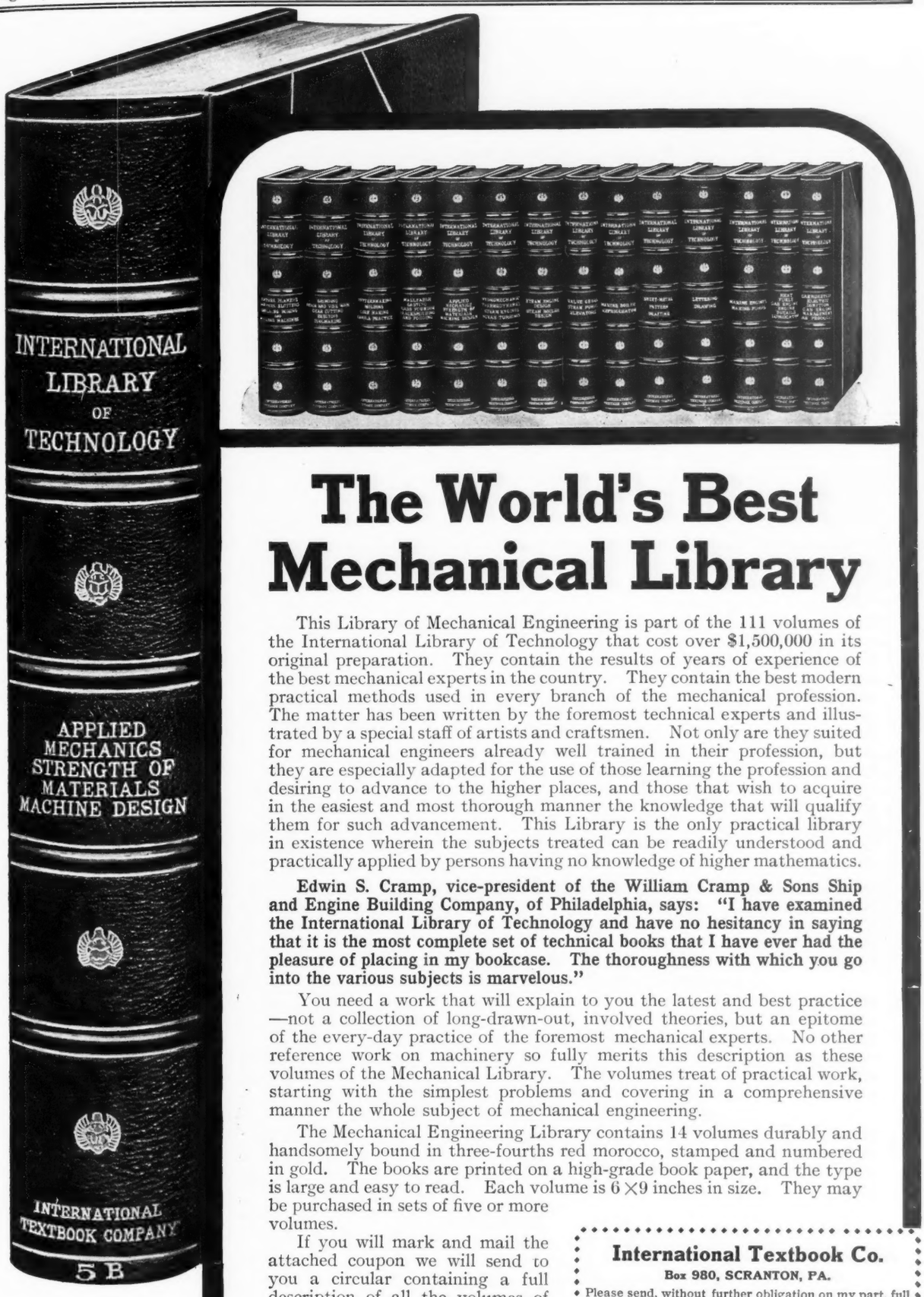

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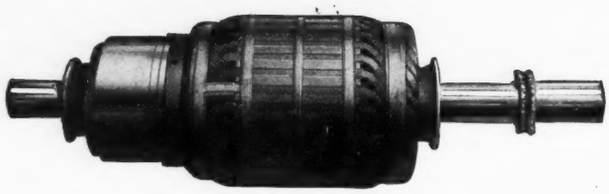
VERSUS

ANTIQUATED METHODS



ARMATURE SHAFT.
Weight 1500 lbs.—shaft 4" in diameter.

From the simple lengthening of a shaft, as illustrated, or reclaiming from scrap a broken one, to the welding of a year's requirements of any certain article for a number of large concerns, **ELECTRIC WELDING** has proven conclusively that the process is an economical and positive aid to the manufacturer.

Have You Considered Costs?

Have you paid for and are you subject to an upkeep expense in the matter of forging dies? Are you using a two or three piece construction where a one piece would be better? Have you tested the efficiency of this modern method—the method that makes possible the solution of the difficult and prohibitive cost problems of a few years ago?

AUTOMOBILE DRIVE SHAFT CASING.

It is impossible that you doubt the reliability of the process; send us your blue-prints and let us make an estimate and convince you that it is also capable of cost reducing and thoroughly satisfactory results.

The Standard Welding Company

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CLEVELAND

Eastern Representative, L. D. ROCKWELL,
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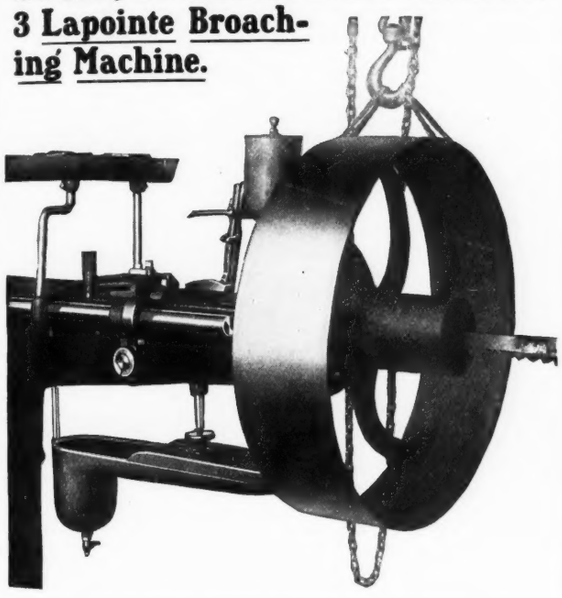
A 5/8" x 10" Long Keyway Broached in a Pulley in 1 minute's time on the No. 3 Lapointe Broaching Machine.

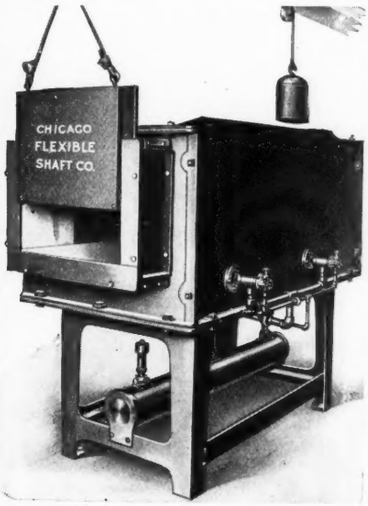


Square or other shaped holes can also be broached just as easily. So what is the use of having two or three special Keyseating Machines when one Lapointe Broaching Machine will do more work and more accurately than any Keyseating Machine. If you do not believe it don't ask Sweeney, but write us.

Lapointe Machine Tool Co., Hudson, Mass.

The Stewart Oven Furnace No. 24

Supplied with burners for oil or gas consumption, whichever is most economical for your locality



This Furnace has lining heavy enough for

Case Hardening

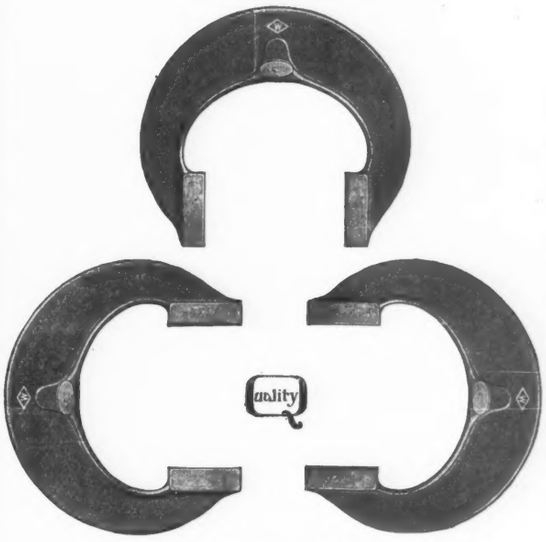
A popular Furnace with automobile manufacturers.

Illustration shows it fitted with oil burners.

Write for full specifications and large general catalogue.

Chicago Flexible Shaft Company
149 La Salle Avenue CHICAGO

Precision
at smallest cost!



Light, excellently designed and carefully wrought drop-forgings which may be machined to a number of measuring combinations, places **precision** in your hands in a way assuring unusual advantages.

Get Circular No. 58.

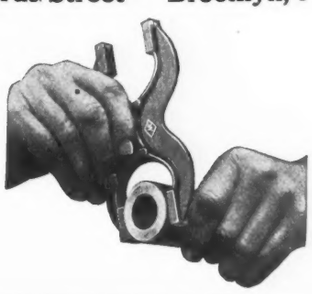
Finish the drop-forgings yourselves to your own most exacting requirements; if you wish directions for hardening or casehardening, command us.

We have "keyed these things" up to the minute:

1. Expansion and contraction possibilities were never better cared for in guage design.
2. Interchangeable work, anywhere, demands Williams' design of Gauges.
3. Lettering panels and sides of jaws are on same plane. Cost of finishing operations held at lowest point.
4. Peerless drop-forgings for "Gauge Work."

External, in double end and "C" forms *See your dealer.* **Internal, in double end form**

J. H. WILLIAMS & COMPANY
Superior Drop-Forgings
61 Richards Street Brooklyn, New York



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For Your Tool Room Work

Will give better satisfaction than any others. Carbondite is exceptionally hard and tough, in fact the hardest artificial abrasive made; the crystals are more compact than others and when crushed, the grains closely resemble emery or corundum in shape. It is particularly adapted for tool room grinding, and has all the essentials for hardened cylindrical work—is cool cutting, free cutting, will not draw the temper of the steel, will not glaze and does not wear away rapidly.

Our line of Grinding Wheels includes shapes for every operation, is graded to suit all classes of work, and adapted for the various makes of grinding machines.

Ask about the patent Safety Collar.

Catalogue 6-M for full particulars.

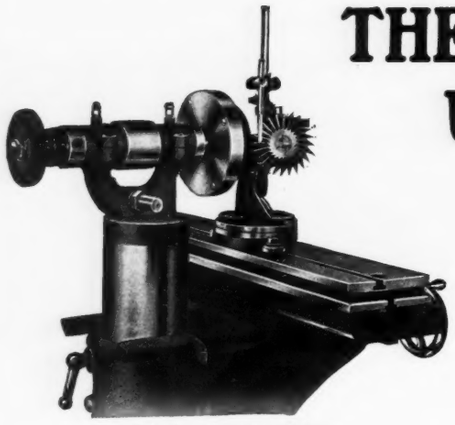
THE SAFETY EMERY WHEEL COMPANY

SPRINGFIELD, OHIO

FOREIGN REPRESENTATIVES—Pfeil & Co., London. V. Lowener & Co., Copenhagen. Adler & Eisenschitz, Milan. De Fries & Co., Act. Ges., Dusseldorf, Berlin, Wien and Paris.

There is a "Best" way to Grind Tools

A way that means more and better work from every machine—the ultimate aim of every efficiency engineer. You may not need a "speed boss" or a "what to do next" chart, but you are cheating yourself if you do not have your tools ground right—ground as they will be with



Grinding Angular Cutter

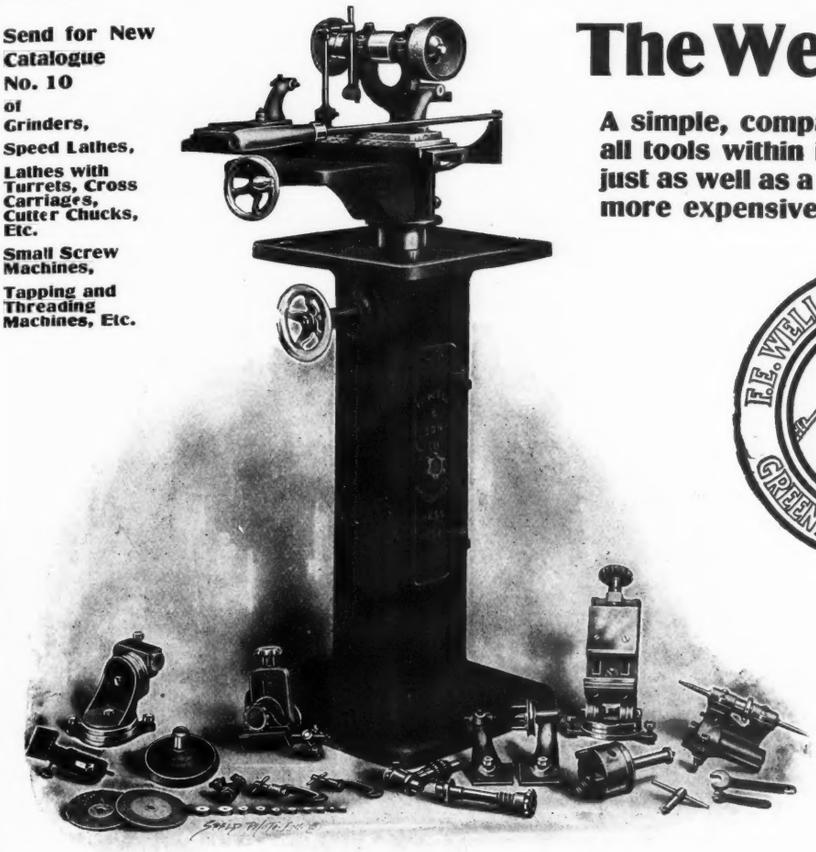
THE GREENFIELD UNIVERSAL GRINDER

This machine will keep every tool up to standard. It is adapted for grinding cutters, reamers, taps—tools of every kind—and a wide range of general work as well.

Interesting illustrated catalog on request.

Greenfield Machine Co., Greenfield, Mass.

Send for New Catalogue No. 10 of Grinders, Speed Lathes, Lathes with Turrets, Cross Carriages, Cutter Chucks, Etc. Small Screw Machines, Tapping and Threading Machines, Etc.



The Wells Grinder

A simple, compact machine for grinding all tools within its capacity, quicker and just as well as a larger and consequently more expensive machine.

F. E. WELLS & SON COMPANY — GREENFIELD, MASS. U.S.A. — Wells

It grinds work 6 diameter by 14″ long.

It has no long overhanging slides.

It is furnished either as a complete universal machine or with only the equipment needed for any special job or for any one kind of work.

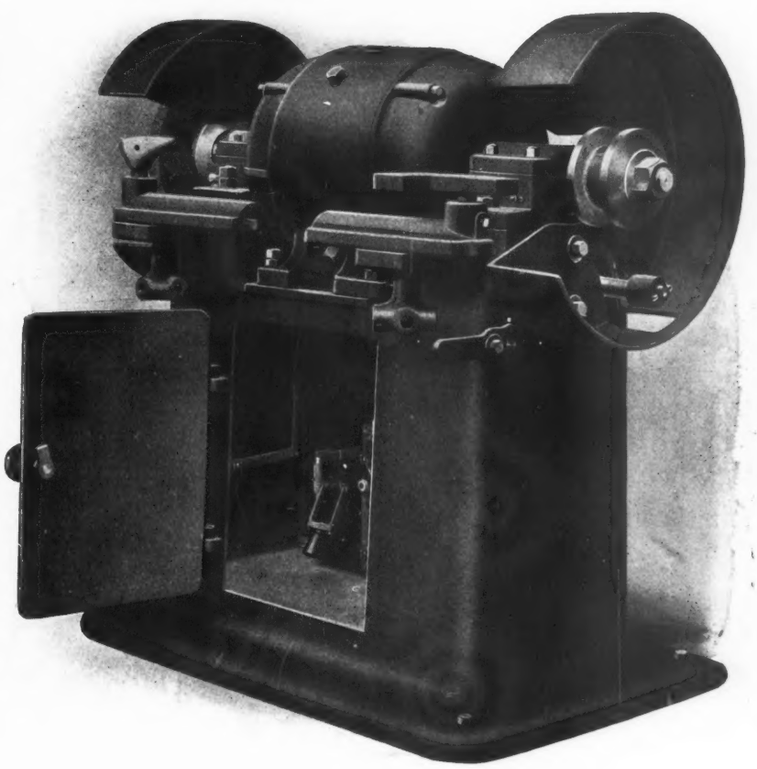
Ransom Controllers Maintain Grinding Wheel Efficiency

As the wheel wears down it is necessary to speed up the arbor to get the greatest quantity of the best work.

Cone pulleys, variable speed motors, etc., are unsatisfactory and complicated—few operators know how to use them rightly, or take the trouble to figure out the speed necessary for efficiency and safety.

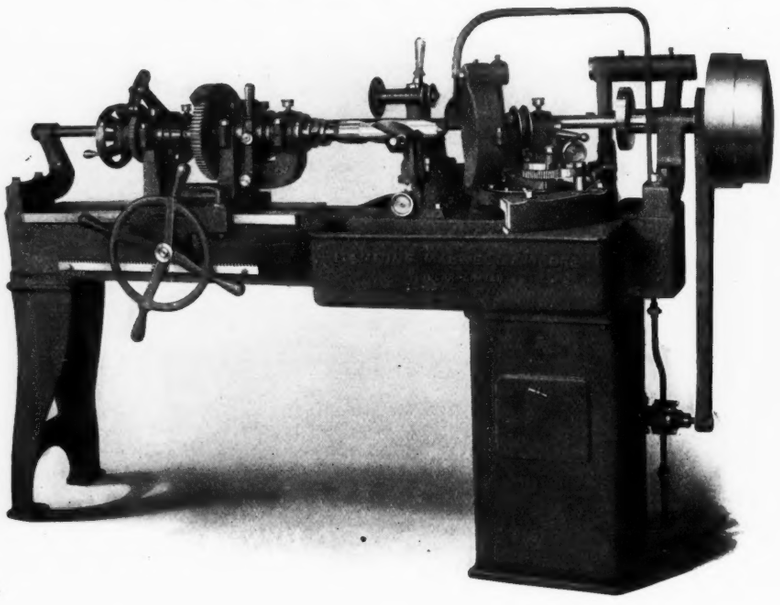
There is no guesswork with a Ransom Patent Speed Controller. One lever operates a rheostat and automatically gives the correct speed for any size of wheel used. May be applied to any Ransom Direct Current Grinder, and marks the radical improvement so long demanded in grinding work.

Let us send the details.



Ransom Manufacturing Company, Oshkosh, Wis., U. S. A.

Dahl Automatic Drill Grinder



GRINDS DRILLS, SIZES ⅛" TO 3½", AND IS THE ONLY GRINDER ON THE MARKET WHICH WILL WORK ENTIRELY AUTOMATICALLY. AN UNSKILLED OPERATOR CAN EASILY GRIND A DRILL WITH ABSOLUTE ACCURACY.

Write for special circular.

SOLE DISTRIBUTORS

MANNING, MAXWELL & MOORE

INCORPORATED

85-87-89 Liberty Street, New York

MACHINE SHOP AND FOUNDRY EQUIPMENT OF EVERY DESCRIPTION

111-115 No. Canal St. CHICAGO	721 Arch St. PHILADELPHIA	45 Oliver St. BOSTON	Frisco Bldg. ST. LOUIS	Park Bldg. PITTSBURG	1262 Ontario St. CLEVELAND

Monadnock Bldg. SAN FRANCISCO	Candler Bldg. ATLANTA	Traction Terminal Bldg. INDIANAPOLIS	White Bldg. BUFFALO	Majestic Bldg. DETROIT	Merrill Bldg. MILWAUKEE	Yokohama JAPAN

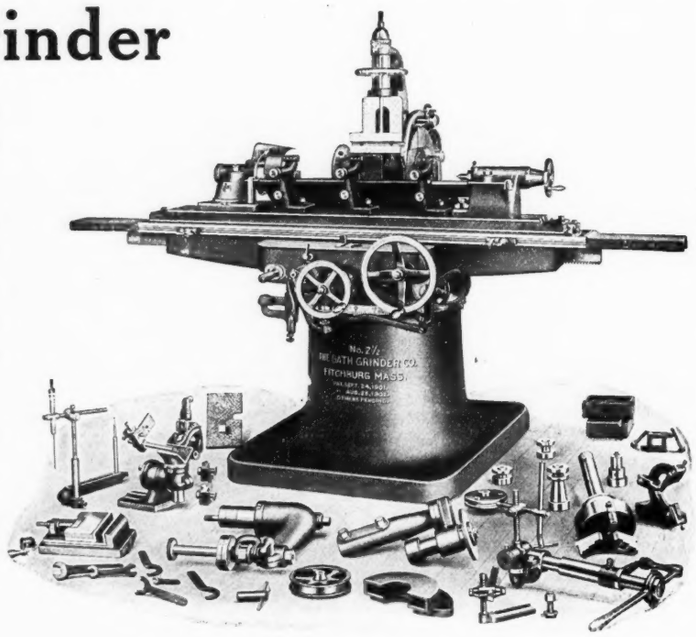
If you have Never Operated a Bath Universal Grinder

Ask us to send you our catalogue and tell you where you can see one in operation.

You may be familiar with the universal grinders that do only *three* kinds of grinding, and have formed the opinion that *five* kinds cannot be done on one machine, and done well.

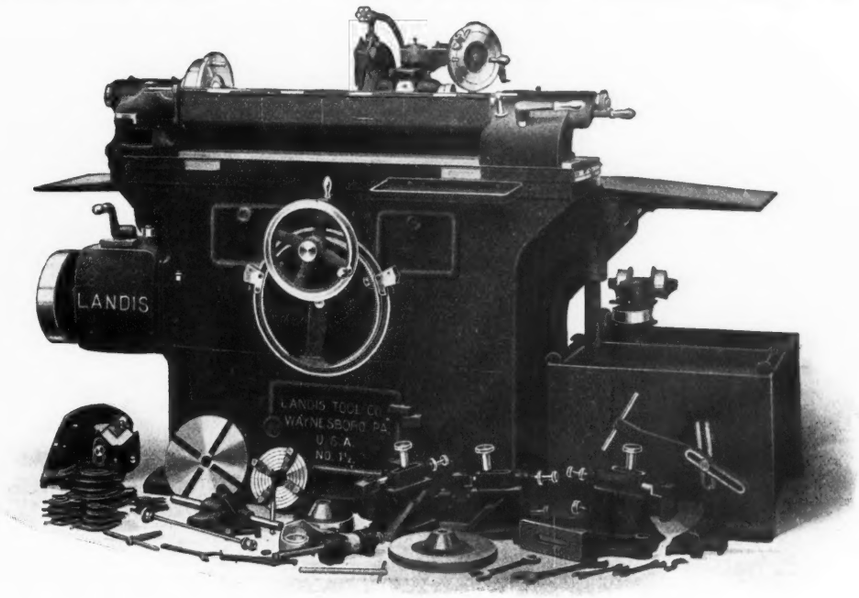
That's up to us to prove, and we can, if you will give us a chance.

Remember it's the BATH—the grinder that does *five kinds of grinding* and completes every job.

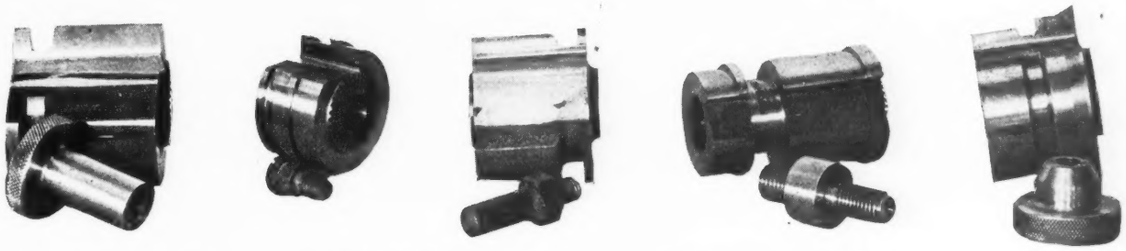


THE BATH GRINDER COMPANY, Fitchburg, Mass., U.S.A.

FOREIGN REPRESENTATIVES: Schuchardt & Schutte, Stockholm, Berlin, Vienna, St. Petersburg, Copenhagen, Budapest. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Alfred Herbert, Ltd., Yokohama. Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow.



Automatic Machine Forming Cutters



Considering the present day high rate of production required of automatic machines, this is only made possible and maintained by the use of high speed steel in the cutters.

In the making of these cutters it becomes practically impossible, owing to the intense heat required, to harden without distortions and scaling. Either or both of these conditions, in cases of complicated forms, changes the shape to the extent that frequently the cutter cannot be used and has to be made over several times, before anything nearly like satisfactory results can be obtained. Even then, while the form at the opening for the cutting edge may have remained in good shape, a short distance back from the edge the surface will be so irregular that when this point has been reached by repeated sharpening, the cutter will have to be abandoned and a new one made, thus getting a small amount of the service that could be obtained if the form were true all the way around.

All of these difficulties are overcome by the grinding process.

Grinding, being the last operation after hardening, ensures a continuous true form which is maintained all the way around the cutter, and as it is used up by repeated sharpening the last portion of the cutter will make the work just as true and accurate as at the beginning. The accompanying cut shows cutters (with specimens of their work) which have been ground on the LANDIS UNIVERSAL GRINDER. The entire forms were ground, including the fillets, shoulders and round corners. These are just a few examples of this class of work which can be handled by our Universal Grinders.

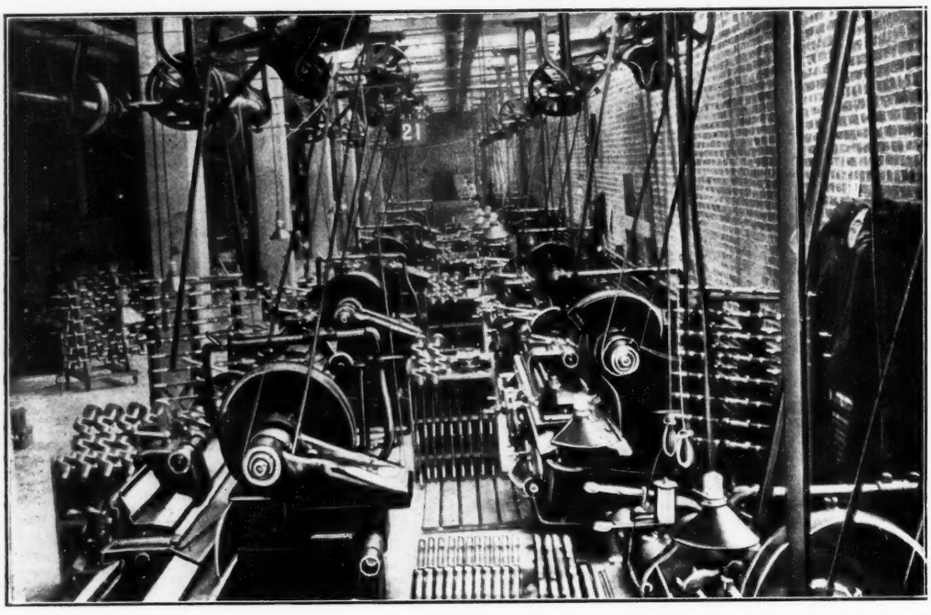
Write for Catalog.

Landis Tool Company, Waynesboro, Pa.

New York Office, Fulton Building, 50 Church Street, Walter H. Foster Company, Managers.

AGENTS:—Dewstoe Machine Tool Co., Birmingham, Ala. Harron, Rickard & McCone, San Francisco and Los Angeles. C. W. Burton, Griffiths & Co., London and Glasgow. Schuchardt & Schutte, Berlin, Stockholm, St. Petersburg, Copenhagen. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Paris, Barcelona and Bilbao. Donauwerk Ernst Krause & Co., Wien, Prag, Budapest. A. R. Williams Machinery Co., Toronto. Williams & Wilson, Montreal, Canada. Andrews & George, Yokohama, Japan.

Battery of Norton Grinding Machines in Operation at the Willys-Overland Company's Shop at Indianapolis, Indiana



Example goes before Precept

With eleven Norton Plain Grinding Machines in commission the crankshafts, pistons, valves, cam shafts, pins, etc., in the "Overland" shops are finished at a saving in cost that discounts old methods 5 to 1. There's a reason here that might apply to your own work.

In the automobile shop, railroad shop, repair plant—in the general machine shop—the economy of grinding machine parts has become a recognized factor. Norton Grinding Machines, plain and universal, are adapted for cylindrical grinding of all kinds. They will produce work accurate to quarter thousandths, are substantial in design, noted for heavy base and wheel stand, have the latest devices for saving time and labor, and are made in sizes to cover almost every requirement.

We shall be glad to mail catalogue and special data, or if desired will send a representative to study your work and estimate the saving to be effected.

NORTON GRINDING CO., Worcester, Mass.

CHICAGO STORE: 11 No. JEFFERSON STREET

AGENTS: Vonnegut Machinery Co., Indianapolis. Robinson, Cary & Sands Co., St. Paul and Duluth. Manning, Maxwell & Moore, Pittsburg, St. Louis, Philadelphia, Atlanta. Prentiss Tool & Supply Co., New York, Boston, Buffalo, Syracuse. Motch & Merryweather Mchy. Co., Cleveland, Detroit and Cincinnati, Henshaw Bulkley & Co., San Francisco, Los Angeles. The Canadian Fairbanks Co., Montreal, Toronto, Vancouver. Alfred Herbert, Ltd., Coventry, England, Paris and Milan. Schuchardt & Schutte, Vienna, Prague, Budapest. F. W. Horne, Yokohama, Japan.

Alundum

TRADE MARK REGISTERED

Grinding Wheels for

NORTON

STEEL

Crystolon

TRADE MARK REGISTERED

Grinding Wheels for

CAST IRON

Sometime you will use Alundum Grinding Wheels for Steel Grinding and Crystolon Grinding Wheels for grinding Cast Iron. The sooner you start, the sooner you will get high production figures and lower grinding costs.

Alundum Plant: Niagara Falls, N. Y.
Crystolon Plant: Chippawa, Canada.
New York Store: 151 Chambers Street.
Chicago Store: 11 N. Jefferson Street.

Norton Company

Worcester, Mass.

190

BESLY GRINDER

FASTEST FLAT SURFACE REDUCER IN EXISTENCE

On the work here illustrated, the average time was

150 Surfaces Per Hour From the Rough

FASTER AND BETTER THAN MILLING OR PLANING—SMALLER INVESTMENT IN MACHINE AND JIGS—NO CUTTERS TO SHARPEN AND REPLACE.

Investigate

Look over the work now faced on your Shapers, Millers, Planers, Lathes and Surface Grinders, and send us some rough samples to be BESLY GROUND, so you may *know* the Finish, Accuracy and Speed of the BESLY GRINDER on *your* work. No charge for the demonstration.

REGISTERED TRADE MARK

No. 14-26 G BESLY DISC GRINDER ON TEXTILE MACHINERY PARTS

Don't let the apparent simplicity of BESLY GRINDERS lead you to think that these results can be obtained with the poorly constructed, so-called disc grinders offered by imitators. Twenty years' experience in the building and use of disc grinders is incorporated in the modern BESLY GRINDER. Ask for BESLY GRINDER CATALOGUE and study the Exclusive Patented Features of this wonderful labor saving tool.

CHARLES H. BESLY & CO.

(ORIGINATORS OF DISC GRINDERS)

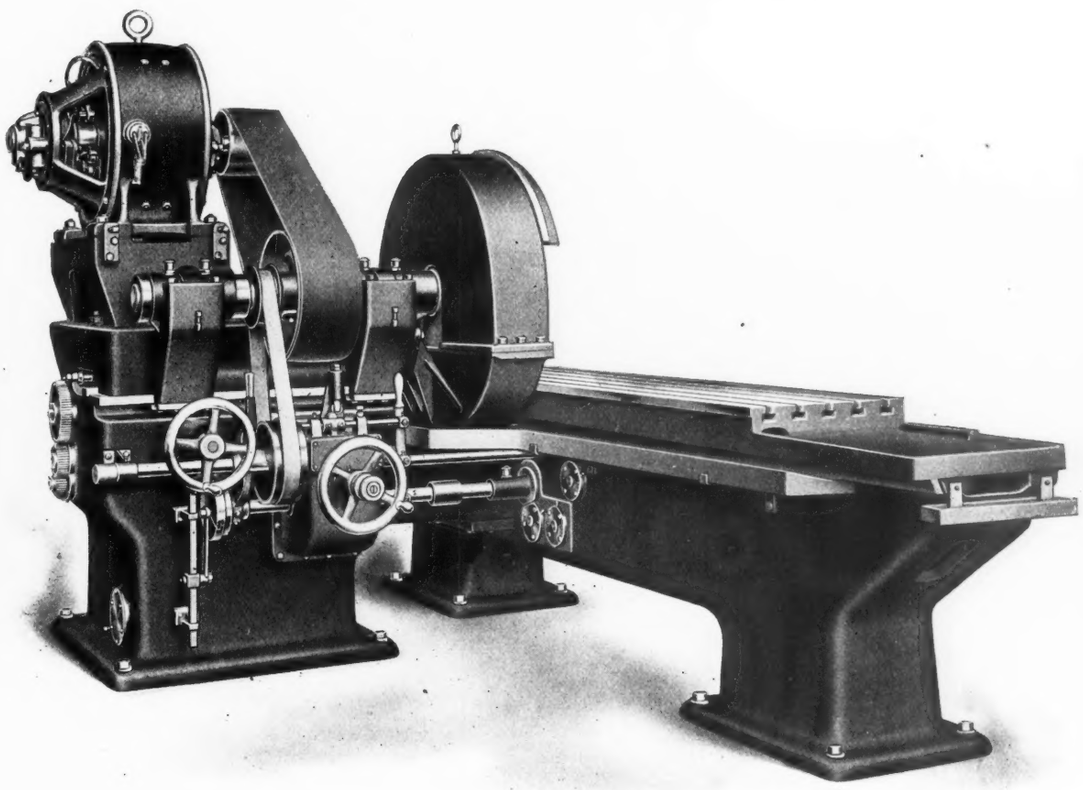
CHICAGO ═══ U. S. A.

Largest Manufacturers of Disc Grinders in the World

Cable Address: CHASBESLY, CHICAGO. A. B. C. and Lieber's Code.

European Agents: Buck & Hickman, London; Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg; Alfred H. Schutte, Paris, Cologne, Brussels, Liege, Milan, Bilbao.

84" SHOP FACE GRINDER



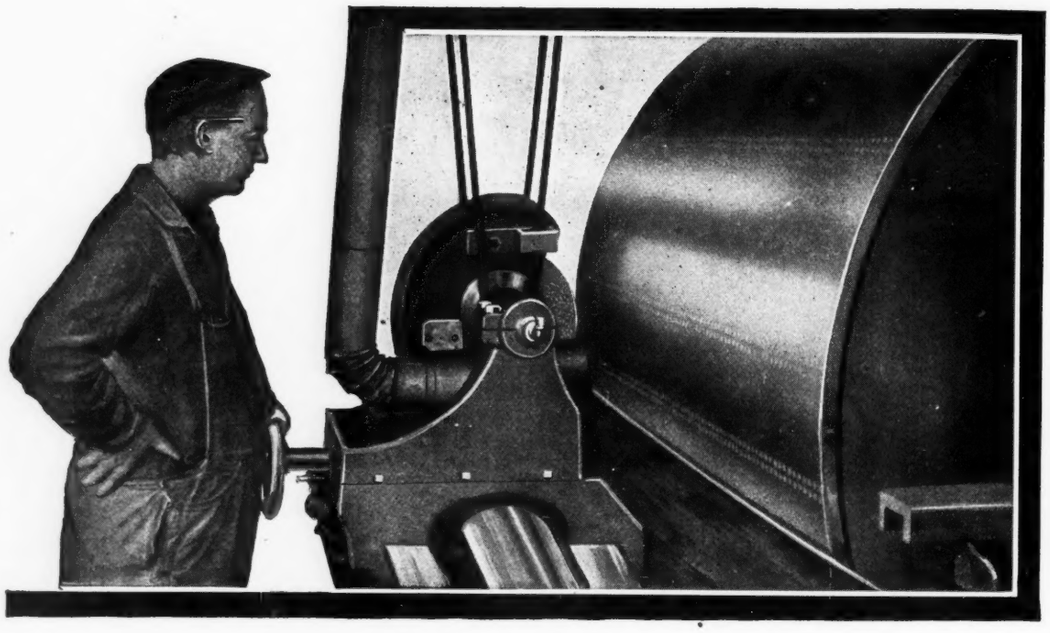
Here is a machine ready for instant use the moment it is set up. No expensive tools or jigs necessary.

Cut shows normal operating side but machine can be as easily controlled when operator is on front side of wheel and table.

This machine is not for special work only, but is as much a "general purpose" tool as a planer.

DIAMOND MACHINE COMPANY

PROVIDENCE, R. I., U. S. A.



Saving A Week In 2½ Hours

IT TAKES a Carborundum Grinding Wheel just 2½ hours to grind a cast iron drum 60 inches in diameter and 60 inches wide. Seven full 10-hour working days is the shortest time in which the best of other wheels ever did the same work under precisely the same conditions.

As the man on the job said, "Life is too short to experiment with other wheels."

The drums are ground at the plant of the foremost manufacturer of wool and worsted machinery. The drums are first turned down and 1-32 is left for grinding. A 14-inch Carborundum Wheel is used and it grinds as many drums in a day as other wheels would grind in a month, cuts clean and gives a better finish.

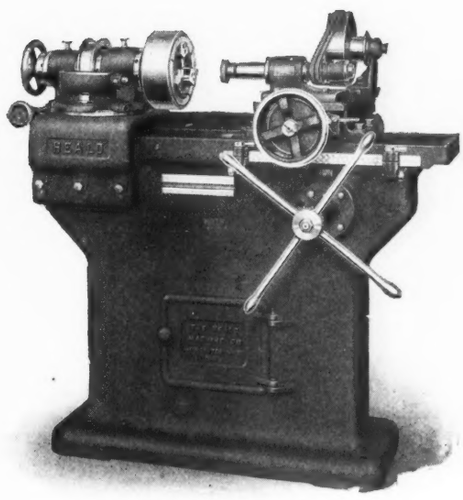
Carborundum Grinding Wheels

are the wheels of today and tomorrow. You should realize from the records made in other shops just how much they will increase and better the work in your shop. Let us tell you how to get the right wheel in the right place.

The Carborundum Company, Niagara Falls, New York

A New Internal Grinding Machine

The Heald No. 75



The Heald No. 75 meets perfectly the demand for a simple and inexpensive machine for grinding short holes up to about 3″ in length, in large numbers of duplicate pieces, such as Transmission Gears, Bevel Gears and Pinions, Bushings, Rings, etc., rapidly, accurately and economically.

On such work, with this new machine, an average operator will produce as much or even more work than with an automatic feed machine.

A large Pilot Wheel, conveniently located, perfectly controls the movements of the table. Positive adjustable stops prevent over-running.

Many parts of the No. 75 are duplicates of, and are interchangeable with, the Heald No. 70 Internal Grinding Machine.

The New Heald Collet Chuck, for the rapid handling of repetition work, is part of the standard equipment of this machine.

In every respect—simplicity, ease of operation, and absolute accuracy—the Heald No. 75 maintains the same high standards as all

Heald Precision Grinding Machines

In a new leaflet, we fully describe the No. 75, as well as the Heald Collet Chuck. Keep posted on the newest features in Internal Grinding! May we send it?

The Heald Machine Company

20 NEW BOND STREET **WORCESTER, MASS.**

AGENTS—Prentiss Tool and Supply Co., New York, Boston, Syracuse, Buffalo. Vandyck Churchill Co., Philadelphia and Pittsburg. The Motch & Merryweather Machinery Co., Cleveland, Cincinnati, Detroit. Vonnegut Hardware Co., Indianapolis, Ind. Hill, Clarke & Co., Chicago, Ill. Alfred Herbert, Ltd., Coventry, England. Fenwick Freres & Co., Paris, France; Belgium and Italy. Ludw. Loewe & Co., Berlin, Germany; Austria, Russia and Holland. Wilh. Sonesson & Co., Malmo, Sweden; Denmark and Norway.

A Typical Blanchard Grinding Job

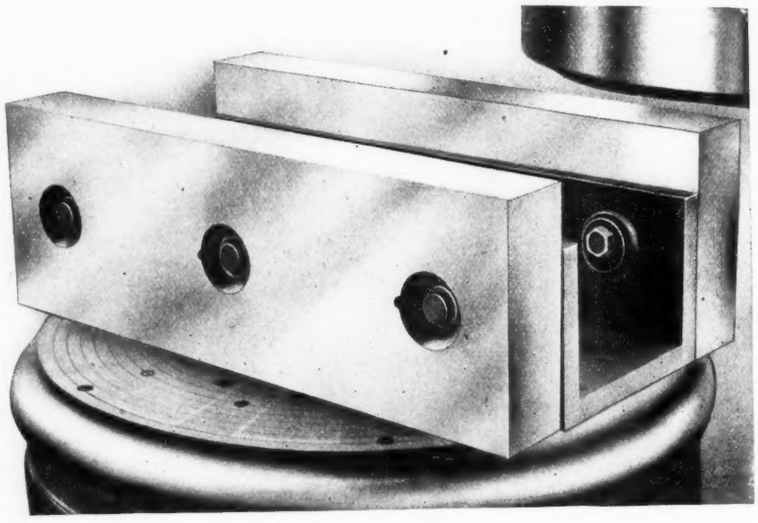
Steel Shear Knives, hardened—

Dimensions, 24″ x 8″ x 2¾″. Ground, two sides, two edges, 1/32″ stock removed from each.

Time—

Flats, 3 pieces per hour.
Edges, 4 pieces per hour.

A good example of how rectangular work is handled.



The Blanchard High Power Vertical Surface Grinder

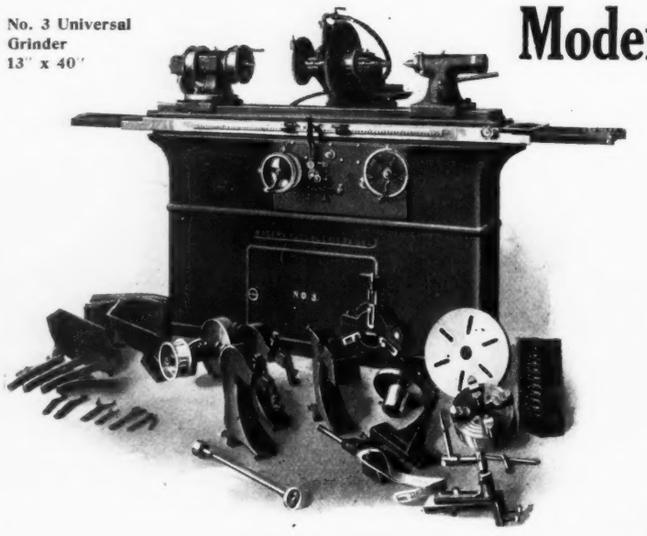
is built with the weight and power necessary to assure rigidity and accuracy under all conditions, is adapted for grinding flat surfaces of round, rectangular or irregular pieces, handles all materials, and has every convenience for holding work easily and firmly.

Write us for catalogue or special data.

THE BLANCHARD MACHINE CO., Cambridge, Mass.

AGENTS—Prentiss Tool & Supply Co., Motch & Merryweather Machinery Co., Marshall & Huschart Machinery Co., J. P. Kemp, W. E. Shipley Machinery Co., Williams & Wilson, C. W. Burton, Griffiths & Co., Alfred H. Schutte, Schuchardt & Schutte.

No. 3 Universal Grinder 13″ x 40″



Modern Grinding Machines

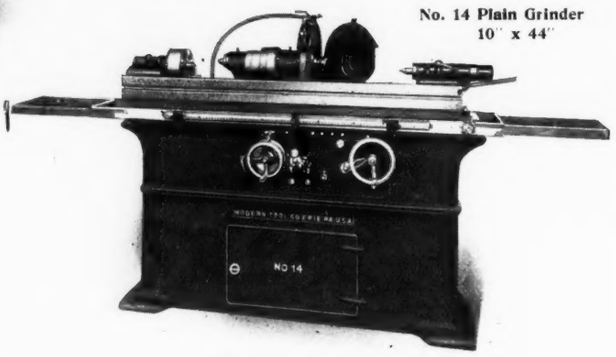
will handle your everyday grinding with speed, accuracy and economy; put special grinding on the same plane of efficiency, and give long service no matter what the line of work.

Both Universal and Plain Machines

are built with sufficient weight to absorb vibration and secure the rigidity essential for high grade work, are fitted with all conveniences and equipped with all attachments.

The **Modern Internal Grinder** is also an A-1 machine that will merit attention.

No. 14 Plain Grinder 10″ x 44″



Catalogue for full description.

MODERN TOOL COMPANY

2d and State Sts. ERIE, PA., U. S. A.

American Grinding Wheels
ON THEIR MERITS

THE satisfactory results produced by American Grinding Wheels are by no means confined to our own country. They are in use in all parts of the world where metal working industries obtain, and have proved their superiority over seas as well as at home. The test given is an example of how we stand in Austrian manufacturing circles.

A recent test in one of the great steel works in Austria has again proven the economy and efficiency of the AMERICAN Wheels over grinding wheels of other makes. In this case the AMERICAN accomplished—1st. A saving in time. 2d. Increase of production. 3d. Saving in power, labor, machines, etc.

The wheels were used for surfacing and grinding out porous places in high speed steel bars, plates, etc. Competing wheel had been used for many years, and with good results, but the test showed the following difference:—

American Wheel ground 54,560 pounds in 504 hours.
Competing Wheel " 47,520 " " 612 "
(Both wheels were entirely used up.)

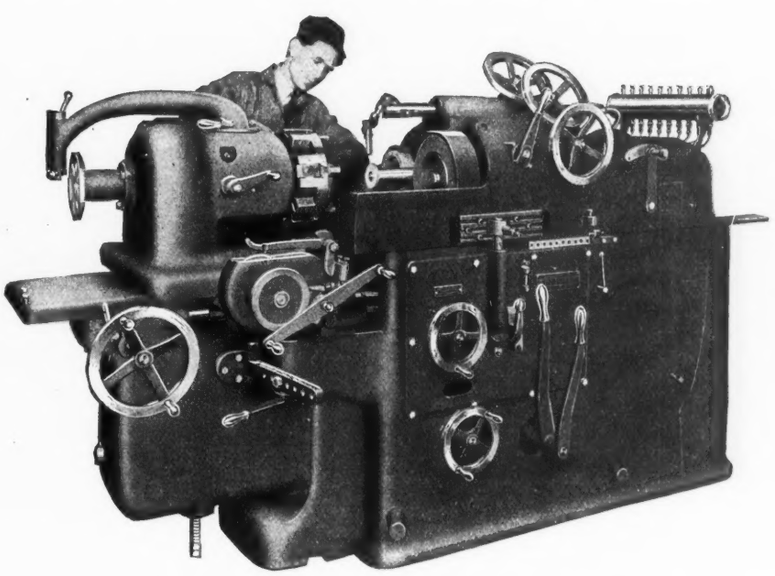
Average production per hour with American Wheel, 108.2 lbs. Cost of grinding 100 kilos with American Wheel . . $1.26
" " " " " Competing Wheel, 77.6 lbs. " " " " " " Competing Wheel . . 1.92

A comparison of these actual figures shows the value of a grinding wheel that is uniform in hardness and texture, made from efficient abrasives and peculiarly adapted for difficult grinding. We have scores of similar experiences. Why not test AMERICAN Wheels on your work ?

AMERICAN EMERY WHEEL WORKS
PROVIDENCE, R. I., U. S. A.
Grinding Wheels for All Operations.

Buck & Hickman, Ltd., London, Liverpool, Birmingham, Manchester, Glasgow. Fenwick Freres & Co., Paris, Brussels, Liege, Zurich, Genoa, Milan; Heinrich Dreyer, Berlin, Germany; Hans Schulze, Vienna, Austria; A. B. V. Lowener, Stockholm, Sweden; V. Lowener, Copenhagen, Denmark; V. Lowener's Maskinforretning, Christiania, Norway; R. S. Stokvis & Zonen, Ltd., Rotterdam, Holland.

You Can Economize on the Grinding



of cast iron parts, hard or soft steel pieces, by using the

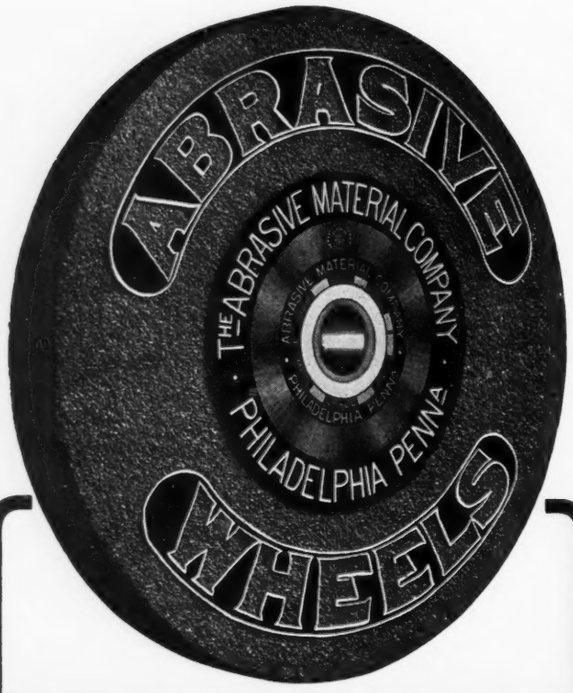
BRYANT CHUCKING GRINDER

for the work. This machine grinds Hole, Face and Outside, at one setting of the piece, saving time, insuring accuracy, and doubling the output.

Our grinding expert will be glad to estimate saving possible on your work.
Write us today.

BRYANT CHUCKING GRINDER CO., Springfield, Vt.

EUROPEAN AGENT—Germany, Holland, Belgium, Switzerland, Austria-Hungary and Italy, M. Koyemann, Charlottenstrasse 112, Dusseldorf, Germany.



ABRASIVE

Fast Grinding Wheels

Three facts:

They do the work better
They do the work faster
They last longer

The Reason—**Abrasive Wheels** show such a remarkable record of grinding economy is not only because of the higher grade materials of which they are made, but also because these materials are combined in exactly the right proportions, which have proven most effective for each different kind of grinding.

There is a special **Abrasive Wheel** for every different purpose.

The Proof—of all this is the great number of satisfied **Abrasive Users** today, and we should be glad to send you the names of some of them in your neighborhood, if you will drop us a line.

You will find that **Abrasive Wheels** "don't merely grind, but cut—cut fast and are durable."

Tell us the special grinding conditions you are up against, and let us send you a wheel specially prepared to overcome them.

Write us today.

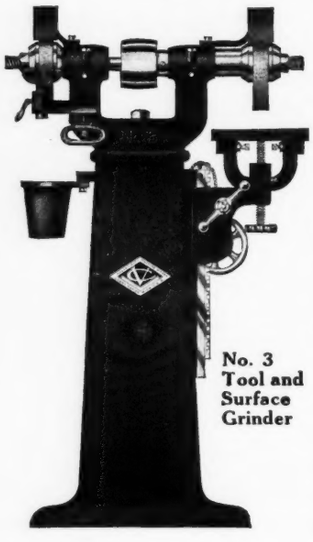
Abrasive Material Company
PHILADELPHIA, PA., U. S. A.

FOREIGN AGENTS: E. Sonnenthal, Jr., Berlin, Cologne and Vienna. Wilh. Sonesson & Co., Malmo and Copenhagen. Glaenzer, Perraud & Thomine, Paris, France. R. d'Aulignac, Barcelona, Spain. Spliethoff, Beeuwkes & Co., Rotterdam, Holland. R. S. Stokvis & Fils, Brussels, Belgium. Alfred Herbert, Ltd., Milan, Italy. Donnell & Palmer, Buenos Ayres, Argentina.

A Reversible Sliding Table

the new attachment for our

No. 3 Tool and Surface Grinder



No. 3 Tool and Surface Grinder

In addition to the fitting of keys, sharpening dies and general tool-room grinding, for which the No. 3 machine was particularly designed, the use of the table will permit the grinding of more intricate work with accuracy and dispatch.

Table can be moved either parallel with or at right angles to the spindle, through the medium of a lever pivoted at one end.

Interesting descriptive catalogue on request.

VALLEY CITY MACHINE WORKS
GRAND RAPIDS, MICH.

CUTTING ABILITY— SAFETY— SPEED

Factors that have placed Sterling Grinding Wheels as the first choice of experienced buyers. Uniform in quality. Made in all shapes and sizes and graded to meet every grinding need.

THE STERLING EMERY WHEEL MFG. CO., Factories and Offices: TIFFIN, O., U. S. A.

BRANCHES: New York House, 45 Vesey Street. Chicago House, 553 West Washington St. San Francisco House, 139-149 Townsend St.

GRINDING WHEEL DRESSERS

WE MANUFACTURE THE ONLY COMPLETE LINE

The **DIAMO-CARBO**—The economical substitute for the Black Diamond.

HUNTINGTON—With milled Cutters—(not punched) made from tool steel, carefully hardened and tempered.

SHERMAN—More economical on large and coarse wheels than the Huntington. Two sizes.

Cutters for No. 1—1½" diameter. Cutters for No. 2—2⅜" diameter.

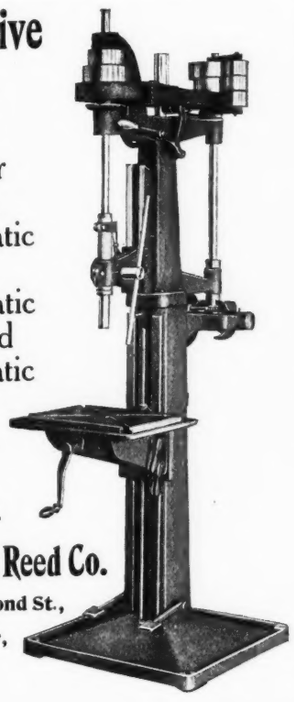
Samples of any style sent on request.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Chas. Churchill & Co., Ltd., London, E. C.
Fenwick Freres & Co., 8 Rue de Rocroy, Paris, France. Alfred H. Schutte, Cologne.

Sensitive Drills

With or without Automatic Feed, Automatic Stop and Automatic Quick Return of the Spindle.



Francis Reed Co.

43 Hammond St.,
Worcester,
Mass.

THRUST BALL BEARINGS

PRESSED STEEL MFG. CO.,
504 LAND TITLE BLDG.,
PHILADELPHIA, PA., U. S. A.

ENGLISH AGENTS: Smith Bros., Aylestone Park, Leicester, Eng.

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Patents secured promptly and with special regard to the full legal protection of the invention.
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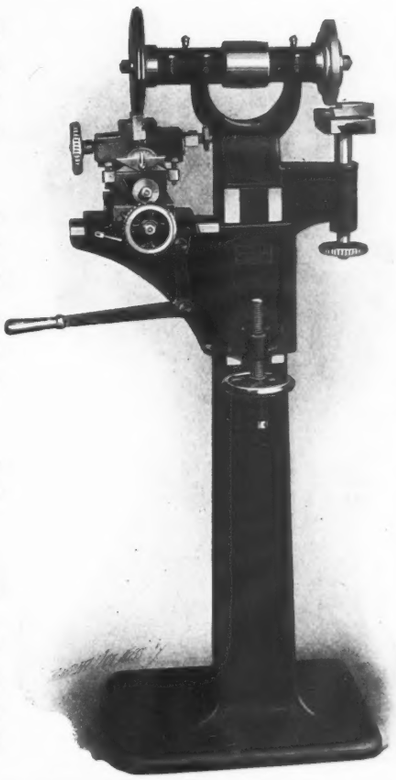
Washington, D. C.

Where Exactness is of great Importance, use the New "Geometric" Chaser and Die Grinder

Keep your dies sharp, grind all the chasers of a set with absolute uniformity, and maintain the accuracy essential to first class screw-cutting.

The difficulties of hand grinding are entirely overcome by this machine, and all makes of thread chasers—stock or special, right or left hand—may be ground square, or with any radius according to shape.

Catalog of Geometric Screw Cutting Tools and Machines on request.



THE GEOMETRIC TOOL CO.
NEW HAVEN, CONN.

PACIFIC COAST AGENTS: The Compressed Air Machinery Co., San Francisco, Cal.
FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. Schuchardt & Schutte, Vienna, St. Petersburg, Stockholm, Berlin. Van Rietschoten & Houwens, Rotterdam, Holland.

STAR CARBON EMERY WHEEL DRESSER

Has a wider range of usefulness than the Diamond point dresser

If the composition in our only competitor's tube filled dresser was made up into a wheel, we could cut the wheel with the Star. Our pamphlet will explain why. Send for one.

C. H. STEPHAN MFG. CO. SPRINGFIELD, OHIO

Grinding Machines

Different Styles and Sizes for Floor and Bench.

EMERY WHEEL DRESSERS

No. 1 For Regular Shop Use

No. 2 For Large Wheels

These Dressers in connection with our Cutters make a most powerful and efficient tool, especially our No. 2 which is made proportionately larger and stronger for large wheels.

CUTTERS

We make the regular "Huntington" (pattern) Paragon Cutter and Roughing Cutter for Dresser No. 1, and the "Huntington" (pattern) and Roughing Cutters for Dresser No. 2.

Let us send you descriptive circular and prices.

GEO. H. CALDER, Lancaster, Pa., U. S. A.

We are NOT the "originators" of

DISK GRINDERS

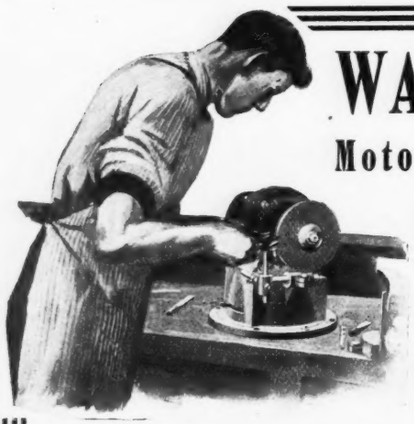
but if you are in the market for one, better see our circular.

HOYSRADT & CASE, Kingston, N. Y.

SHAPERS EXCLUSIVELY 12 to 32 INCH STROKE

SMITH & MILLS CO., Cincinnati, Ohio, U. S. A.

FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London. G. & F. Limbourg Freres, Brussels. Van Rietschoten & Houwens, Rotterdam Glaenzer, Perreaud & Thomine, Paris. Stussi & Zweifel, Milan.



WATSON

Motor Driven Buffers and Grinders

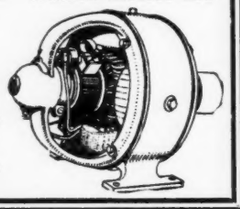
are a positive necessity in every factory where tools must be kept sharp. Always ready for instant use at the turn of a switch. Buffers and grinders separate or in combination—bench or pedestal type. Full particulars are given in Booklet A. Write for it now.

WATSON MOTORS

The world's greatest achievement in small motor building. Exceptionally compact, highly efficient and made for wide variation of speed.

Built in all sizes for polyphase alternating current and for direct current service.

Write today for full particulars. Watson motors are guaranteed to save you money.

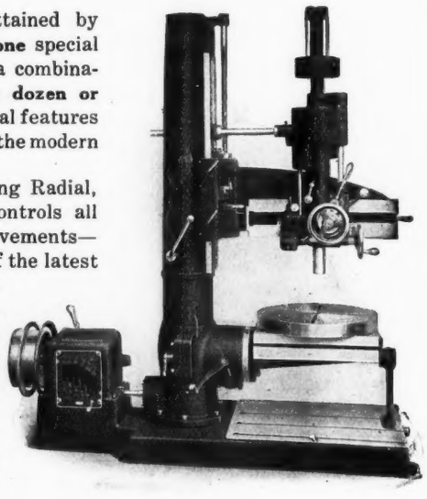


MECHANICAL APPLIANCE CO.

Dept. C. MILWAUKEE, WIS.

GANG SUPERIORITY

was not attained by perfecting **one** special point—it is a combination of the **dozen or more** practical features essential to the modern radial drill.



In the Gang Radial, one lever controls all spindle movements—Speed box of the latest geared type gives twelve speed changes — Arm swings on ball bearings—Column has long bearings, insuring rigidity. All the time and trouble saving devices included.

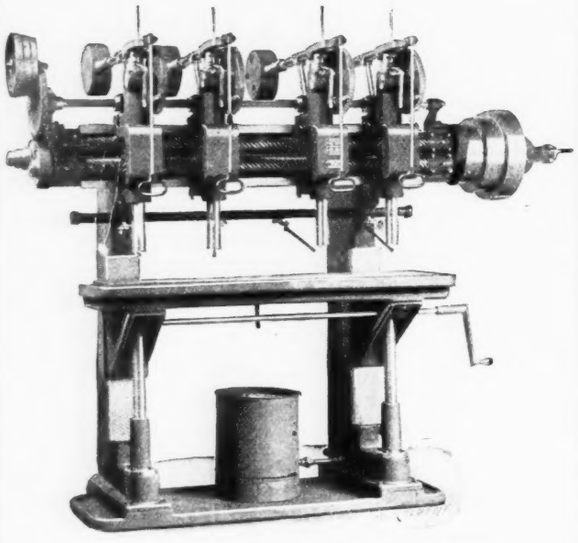
2½, 3, 3½ and 4 ft. sizes.

Ask about our Friction Type Head, Style G.

THE WM. E. GANG COMPANY

CINCINNATI, OHIO

DOMESTIC AGENTS: Hill, Clarke & Co., Boston, Chicago, Philadelphia and New York. J. J. McCabe, New York, N. Y. Baird Mchy. Co., Pittsburg, Pa. W. M. Pattison Supply Co., Cleveland, O. W. R. Colcord Mchy. Co., St. Louis, Mo. Pacific Coast Mfg. Co., Los Antcles, Cal.
FOREIGN AGENTS: The Canadian Fairbanks Co., Ltd., Dominion of Canada. Sanford & Co., Monterey, Mexico. Limbourg Freres, Brussels, Belgium.



No. 22 D Independent Spindle Feed Drill

Moline "Hole Hog" Drills

Adapted for all classes of light or heavy drilling. A machine for every purpose.

Moline Tool Company
Moline, Ill., U. S. A.

Our Thorough Knowledge of Grinding Requirements Permits us to Furnish

Vitrified Grinding Wheels

that are satisfactory for every class of work.

The success of an abrasive wheel is directly proportional to its adaptability for the work on which it is to be used, and, because every proposition is carefully considered before we recommend the wheel to handle it, the list of satisfied "Vitrified" customers is a long one.

Tell us the line of work and we will send the facts you need.

VITRIFIED WHEEL COMPANY

WESTFIELD, MASS.

Rowbottom Disc Grinders

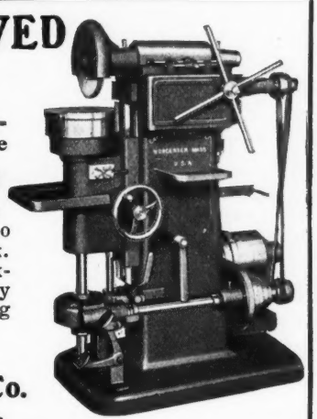
Bearings are Fixed and Fool Proof

The Hess-Bright Ball Bearings are non-adjustable, and cannot be put out of true by inexperienced tinkering. The tables are adjustable to and from, and at any angle to face of discs. They are carried on substantial trunnions and are carefully balanced to swing across the face of discs, or may be securely clamped in position. Well built, accurate, substantial grinders—three sizes.

Write for descriptive circular.

The Rowbottom Machine Company
WATERVILLE, CONN.

DOLLARS SAVED IN GRINDING



Piston rings are ground accurately and quickly on the

BAY STATE GRINDER

Foot controlled magnetic chuck leaves hands free to manipulate feed and work. Output limited only by dexterity of operator. A money making machine for grinding rings or circular work.

Ask for Circular.

Bay State Grinder Co.
WORCESTER, MASS.

SAVE MONEY, DRILLS and TIME

In this new double-end NEW YANKEE drill grinder. The only way you can keep from paying for a NEW YANKEE is to buy it and let it pay for itself. They are the only drill grinders that not only grind a drill perfectly, but grind it in less time than by hand. Made in 100 styles, sizes and combinations.

A new free catalog is now ready for mailing. Ask for copy.

Capacity No. 60 2 1-4 inch drills.

STYLE W P L

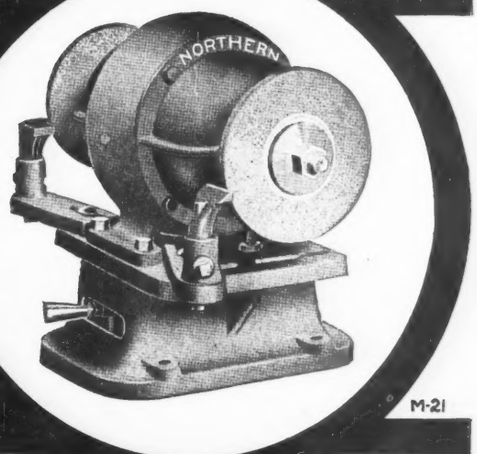
Wilmarth & Morman Co.
580 Canal St., Grand Rapids, Mich.

Transform Your Grinding and Buffing by the Touch of Electricity

Abolish all obstructing overhead belting. Stop the great losses of power incurred by the use of shafting. Throw out the hundred and one disadvantages attendant upon the old methods of Grinding and Buffing. In short install

Fort Wayne Electric Grinders and Buffers

(Northern Type—Direct Current)



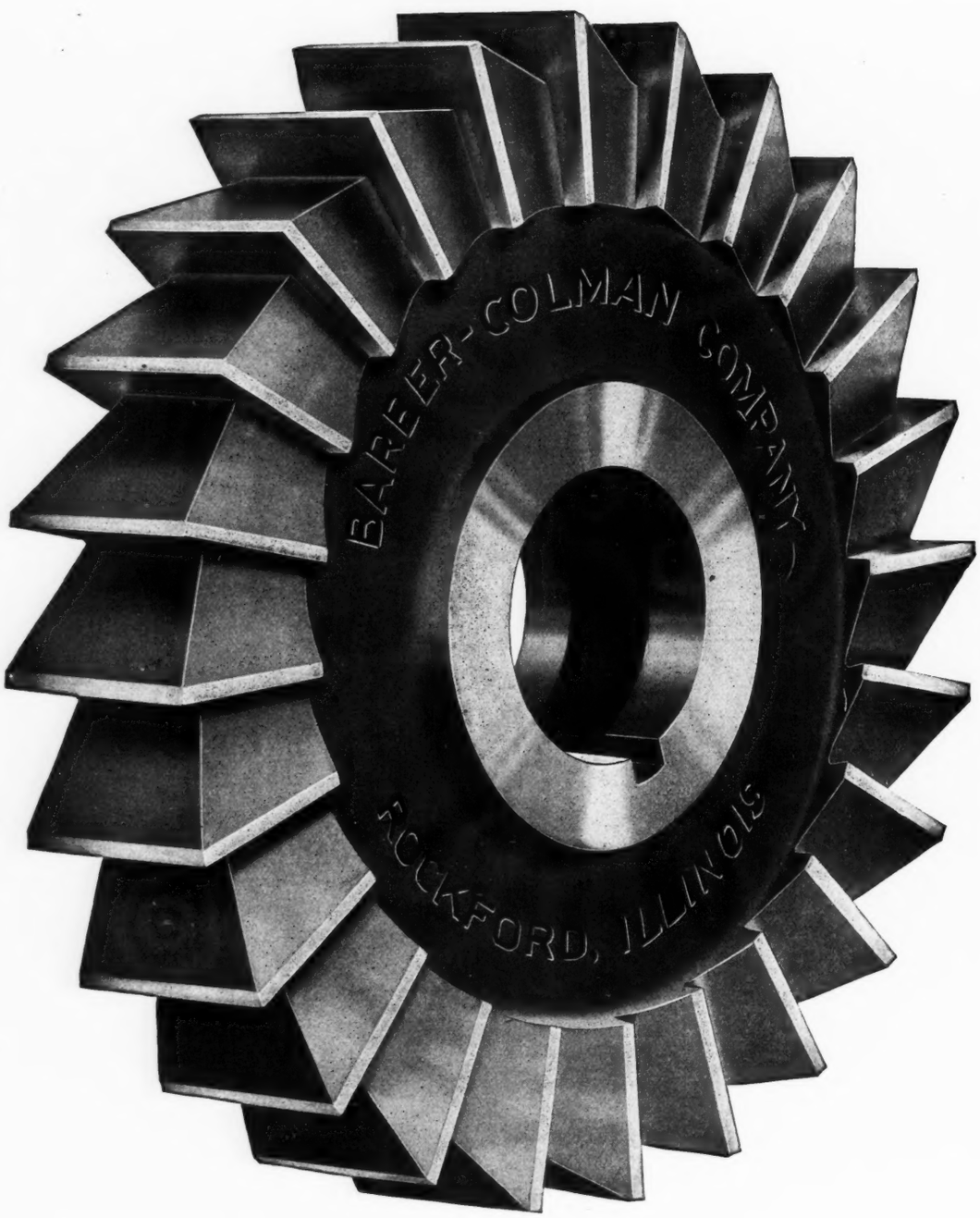
These wonderfully convenient machines are strictly self-contained—embodying the motor, speed control and grinder or buffer in one unit.

They may be placed anywhere, irrespective of line shafts. Especially effective wherever a portable tool is desired, or where frequent rearrangements are required, owing to enlargement of factory capacity or changes in the process of manufacture.

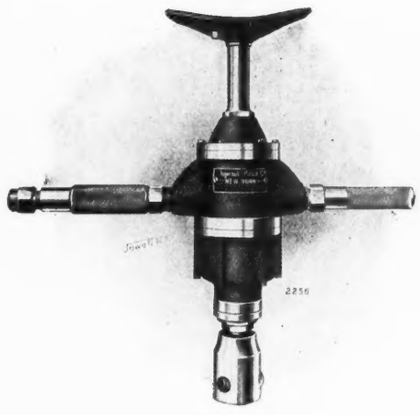
In Grinding Large, Irregular Pieces belts are usually in the way and do not permit thorough work. Here again our Northern Type Electric Grinders overcome every difficulty. Both Grinders and Buffers are made in two styles—pedestal and bench.

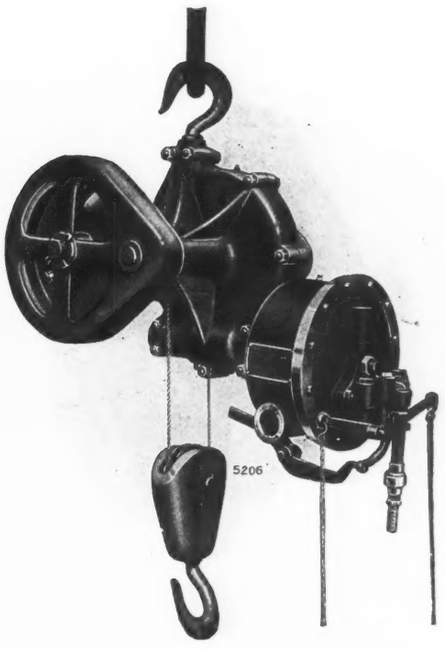
Send for Bulletin No. 1127

Fort Wayne Electric Works
Of General Electric Company
"WOOD" SYSTEMS
1616 Broadway Fort Wayne, Ind.
Branch Offices in Most Large Cities


BARBER-COLMAN COMPANY
ROCKFORD, ILLINOIS

SHOP ECONOMICS





AIR TOOLS

When you are buying a tool to save time and labor on a particular class of work, BUY ONE WHICH WILL BE A TIME-AND-LABOR-SAVER FOR THE LONGEST TIME.

Some tools do good work longer than others. The best tool is the longest-lived one.

Ingersoll-Rand Air Tools—Hammers and Drills—have the quality of design, materials and workmanship which make them last, doing good work all the time.

AIR HOISTS

"Time is money"—and a time-saver is a money-saver and a money-maker.

For the odd jobs of lifting and handling any load up to five tons, the "Imperial" Air Motor Hoist is a machine that will put money in its owner's pocket.

Self-oiling, dust-proof, wholly enclosed, cleanly, safe, free from vibration—The "Imperial" meets every requirement of hoisting economy.

AIR COMPRESSORS **SAND RAMMERS**

INGERSOLL-RAND COMPANY

NEW YORK **LONDON**

Birmingham Butte Cleveland Duluth Los Angeles Philadelphia St. Louis San Francisco
Boston Chicago Denver El Paso New York Pittsburg Salt Lake City Seattle

Budapest Dusseldorf Johannesburg Kobe London Melbourne Mexico Montreal
Paris Toronto Valparaiso Yokohama

Straight Shank Tool Holder

Left Hand Offset Tool Holder

Right Hand Offset Tool Holder

ARE YOU TIRED

OF PAYING BIG BILLS FOR

HIGH SPEED STEEL

?

READ THIS

"We have used your Tools for several years with perfect satisfaction and we consider them far superior in every respect to any other style that we have used.

"THE USE OF HIGH SPEED STEEL would be almost prohibitory in the shop if the old methods of forging tools still prevailed.

"Kindly hurry the enclosed order, and oblige,

WOOD DRILL WORKS,
Paterson, N. J."

Planer Tool

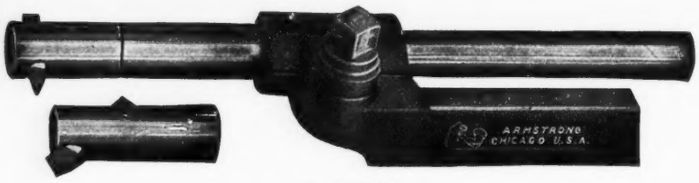
Drop Head Tool Holder

SAVE ALL Forging
70% Grinding, 90% Tool Steel

WANT A CATALOG?

Armstrong Bros. Tool Co.

313 N. Francisco Ave. CHICAGO, U. S. A.



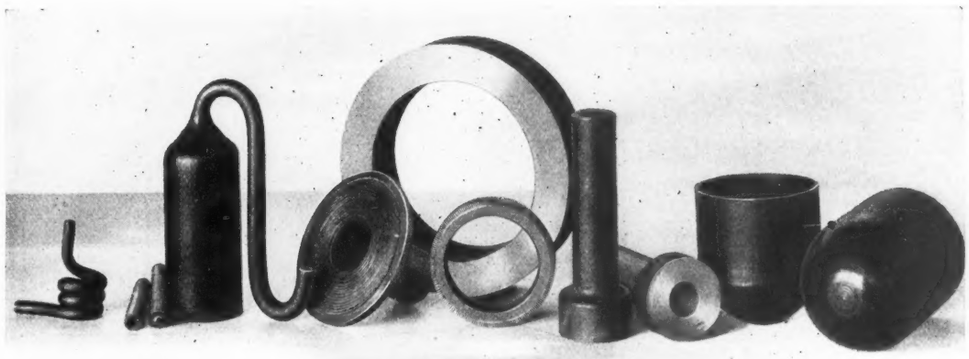
Boring Tool

OTHER TOOLS WE MAKE—Ratchet Drills, C Clamps, Drilling Vises, Lathe Dogs, Automatic Drill Drifts, Lathe Tool Posts, Planer Jacks, Drilling Posts, etc.

¶ *"To take a short length of solid round steel billet and automatically roll a hole through the middle of it, transforming it into a long, slim, seamless steel tube, would seem to be something like the work of a magician." From an article in the American Machinist.*

How Shelby Seamless Cold Drawn Steel Tubing Is Made

The Seventh Chapter—Some Special Manipulations



¶ Not only are Shelby Tubes cold-drawn into an almost endless number of shapes and sizes, but, in addition, they are manipulated in many different ways.

¶ The above pieces were taken from one of our sample display cases, and indicate a few of the many possible manipulations to which Shelby Seamless Steel Tubing is daily being subjected in preparation for machines and numerous mechanical contrivances.

¶ Each piece is numbered below in the order in which it appears in the illustration:

(1) Small coils, bent cold.

(2) Small tubes with round heads.

(3) The larger portion of this shape was made by expanding the small tube. This operation was made more to show the quality of the material and the possibilities of manipulation than for any special useful purpose. Most of the other pieces are to be used for a specific mechanical purpose.

(4) Flange made from tubing without welding on additional material.

(5) Separator used on weaving machinery. (Note the considerable amount of fine grooves cut in this piece without affecting the integrity of the material.)

(6) Tubes with ends upset.

(7) Large tubes with round heads.

¶ Chap. 1, "MACHINERY," February—"Dispelling a Popular Mistake as to the Impossibility of Cold Drawing STEEL." ¶ Chap. 2, March—"Overcoming Two Big Manufacturing Difficulties." ¶ Chap. 3, April—"The Extraordinary Process of Piercing a Hole Through Solid Steel Billets." ¶ Chap. 4, May—"Preparing the Billets for Cold Drawing." ¶ Chap. 5, June—"Cold Drawing the Seamless Steel Tubes." ¶ Chap. 6, July—"The Many Uses of Shelby Seamless Steel Tubing."

We've a booklet, "Shelby Steel Tubes And Their Making," which tells the whole story of a remarkable manufacturing process and describes the many uses to which this superior product can be put. It is not for general distribution, but will be sent free to anyone genuinely interested.

National Tube Company

General Sales Offices: Frick Building, PITTSBURGH, PA.

DISTRICT SALES OFFICES:

Atlanta	Denver	New York	Pittsburgh	St. Louis	San Francisco
Chicago	New Orleans	Philadelphia	Portland	Salt Lake City	Seattle

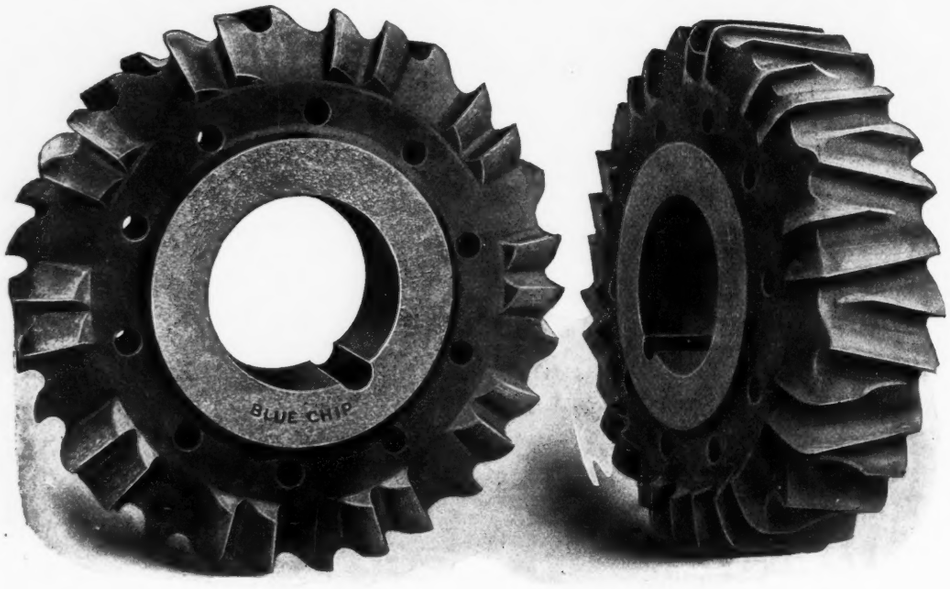
Export Representatives: U. S. STEEL PRODUCTS CO., New York City

THESE SOLID MILLING CUTTERS

9 1-2" diam. by 2 1-2" face, made from

BLUE CHIP STEEL

have been in service for three years Fluting Side Rods. The depth of cut 3-4" to 1 1-8", width of cut 2 1-2". Table feed 2 1-2" to 5" (Design Patented.)



The men who design, make, temper and use tools of this size must have dependable steel.

Are the men in your shop given a steel which will work well, temper uniformly and reflect the skill of the workmen in increasing the cutting capacity?

We do not claim to know more about your Tool Requirements than your workmen do, but FIRTH-STERLING QUALITY, united with the skill and knowledge of your Tool Designers, Tool Makers, Tool Temperers, Tool Grinders and Tool Users, will both effect economies and increase production.

A TRIAL WILL PROVE IT

We do not make or sell tools but we supply the steel.

FIRTH-STERLING STEEL COMPANY

HIGH GRADE TOOL STEELS FOR EVERY PURPOSE

Office and Works: McKEESPORT, PA.

New York Boston Philadelphia Pittsburgh Cleveland Chicago San Francisco

On Hardest Material—On Highest Speed

3 TO 1 AHEAD OF ALL OTHERS

In the selection of suitable steel to meet ordinary, as well as severe, shop conditions, the initial expense is the smallest factor, and to select a steel which will meet both demands will prove an economy when the job is finished and costs actually computed. The use of Novo-Superior means

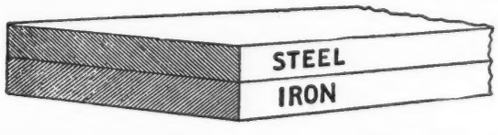
Highest Quality — Rapid Production
Largest Output For Every Dollar Invested

Increase Your Standard of Efficiency

The Supremacy of NOVO=SUPERIOR is Indisputable

Composite Steel For Blanking Dies

(HALF IRON AND HALF STEEL)



SPECIALLY recommended for all kinds of blanking dies, hot and cold trimming dies, snap dies, and specially large and complicated dies which are apt to warp in hardening, owing to the extreme length and difficult shape.

The iron is guaranteed to be pure Norway quality, will not harden, and is cast on the steel and not welded, consequently will never come apart from the steel.

The advantage of this Composite Steel is that the iron being very soft, the die is worked out with greater ease. The soft iron gives the die an elastic backing and prevents it from cracking.

On account of the iron remaining soft, the bottom of the die can always be planed after hardening. All standard sizes in stock.

HERMANN BOKER & COMPANY

101-103 DUANE STREET **NEW YORK CITY**

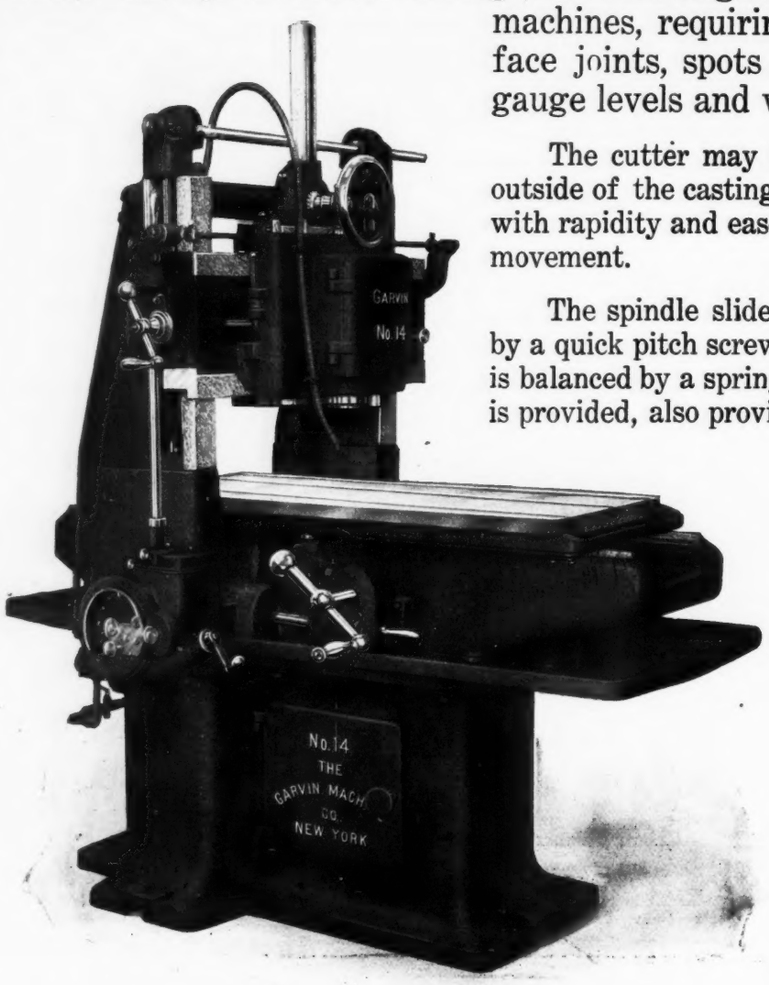
CHICAGO BOSTON MONTREAL

GARVIN No. 14
Vertical Spindle Milling Machines

Used exclusively for machining gear and engine casings of automobiles, railway car motor casings, box castings and frames of special machines, requiring the finishing of surface joints, spots and edges to varying gauge levels and widths.

The cutter may be moved all around the outside of the casting, and dropped down inside with rapidity and ease, and absolute precision of movement.

The spindle slide has a vertical movement, by a quick pitch screw giving 1 in. per turn, and is balanced by a spring. Micrometer stop screw is provided, also provisions for gauge blocks.



GARVIN No. 14 Vertical Spindle Milling Machine
Use Code . . Acclaim

The machine has power feed to cross slide and table with reverse. The changes of feed are easily made by turning a crank while the machine is in cut.

Equipped with our Positive Feed Change Gear Box.

DIMENSIONS

Size of Table	20 x 48 in.
Clearance under Rail	15 in.
Distance between uprights	26 in.
Vertical movement of spindle slide	3 in.
Length of Power Feed	48 in.
Traverse of cross slide	26 in.
Changes of Speed	6
Changes of Feed	12
Floor Space Required	48 x 72 in.
Crated Weight	4200 lbs.

Send for Circular No. 142.

FOR FURTHER INFORMATION { ASK YOUR DEALER OR WRITE US DIRECT

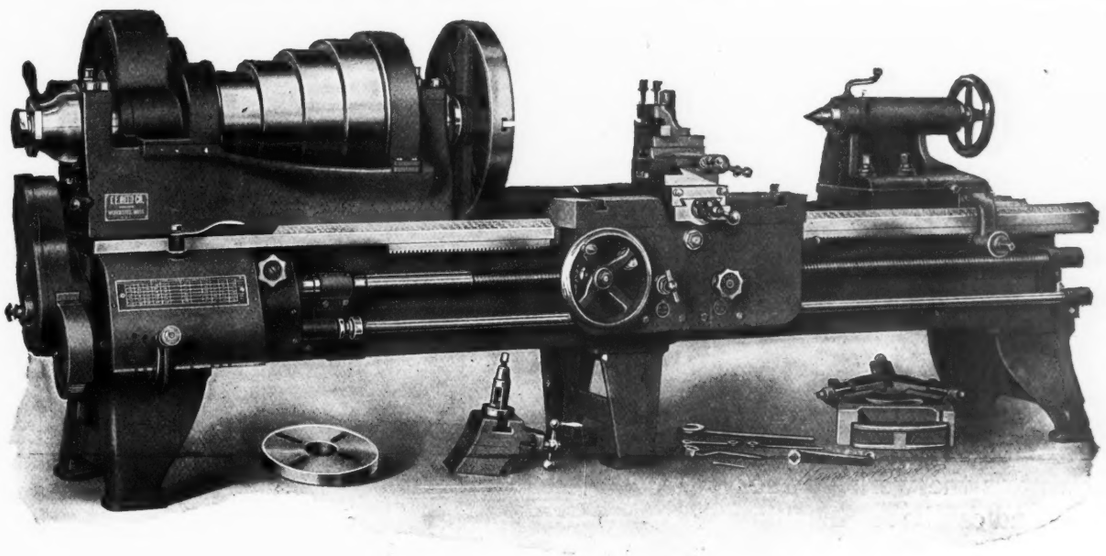
Immediate Delivery

MANUFACTURED BY

THE GARVIN MACHINE CO.

Spring and Varick Streets 45 Years in **NEW YORK CITY**

VISITORS WELCOME



Railroad Work Demands a Heavy Lathe

This 24-inch Heavy Duty "Reed" Lathe is particularly adapted for such service. Note the strong, massive headstock, bed, tailstock, carriage and apron—all made *extra rigid* to withstand the constant strain of heavy turning.

And when it comes to making *quick changes*, the "Reed" has all the others beaten to a standstill—54 changes for both lead-screw and feed-rod being instantly obtainable by its quick change gear mechanism. This mechanism is strong and simple—there is nothing to go wrong, because whatever the position, the levers and sliding gears are so arranged that they cannot lock the mechanism and cause breakage. Particular attention is called to the fact that *both* feeds cannot be engaged at the *same time.*

If you require a lathe for rapid production—the "Reed" with its many improvements will surely please you. Made also in three other sizes: 18, 20 and 22 inch.

Full details on request.

F. E. REED COMPANY, Worcester, Mass.

SELLING AGENTS—MANNING, MAXWELL & MOORE, Inc., 85-87-89 Liberty St., New York, N. Y.

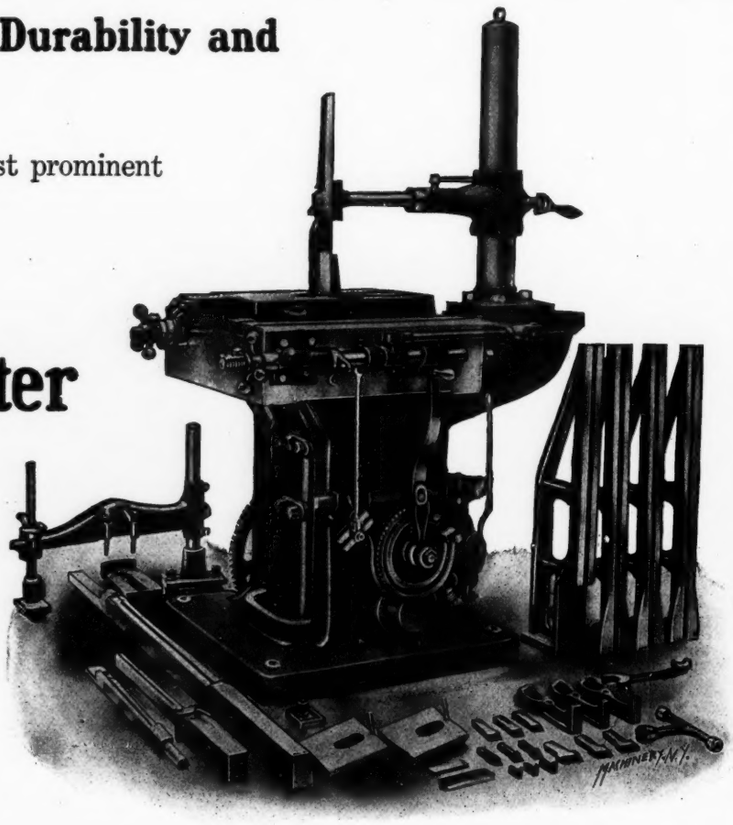
111-115 No. Canal St., Chicago, Ill.
Merrill Building, Milwaukee, Wis.
White Building, Buffalo, N. Y.
Cor. Oliver & Franklin Sts., Boston, Mass.
Frisco Building, St. Louis, Mo.
Atlanta, Ga., Candler Building.
Indianapolis, Ind., Ter. Trac. Building.
721 Arch St., Philadelphia, Pa.
Majestic Building, Detroit, Mich.
San Francisco, Cal., Monadnock Building.
1262 Ontario St., Cleveland, O.
Park Building, Pittsburg, Pa.
Mexico City, Mexico.
Yokohama, Japan.

Thomas & Lowe Machinery Co., Providence, R. I. Syracuse Supply Co., Syracuse, N. Y. Chas. A. Strelinger Co., Detroit, Mich. Fenwick Freres & Co., Paris, France. Chas. Churchill & Co., Ltd., London, Eng. The A. R. Williams Machinery Co., Ltd., Toronto, Ont. Van Rietschoten & Houwens, Rotterdam, Holland. G. Koeppen & Co., Moscow, Russia. F. G. Kretschmer & Co., Frankfort, a. M., Germany. C. & J. W. Gardner Co., St. Petersburg, Russia.

Rapidity, Accuracy, Durability and Ease of Operation

are the features most prominent in the

Morton Key Seater

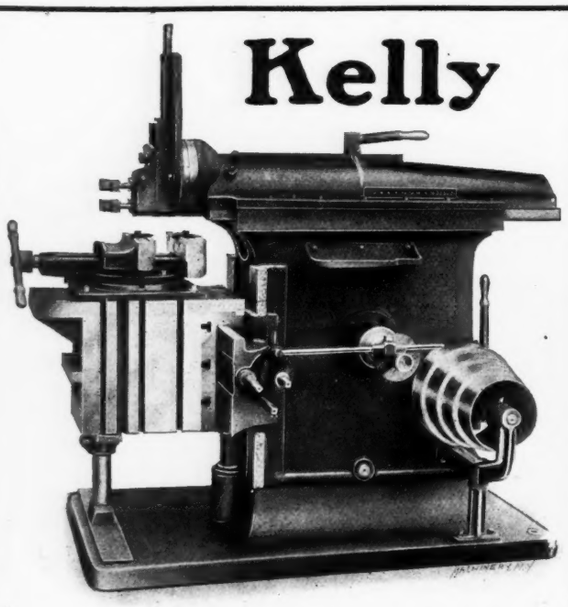


It centers the work by the bore and can be set to cut a keyway of a given size and taper, without a rule and before it is placed on the machine.

Investigate the Morton

Morton Mfg. Co.
Muskegon Heights, Mich.

Kelly



There are a lot of jobs for Kelly Crank Shapers to do, work too small for a planer, yet demanding the close accuracy—"hair line" accuracy—for which Kelly Machines are noted. Kelly Crank Shapers are fast, accurate, easy to operate and long wearing.

Want the book?

THE R. A. KELLY COMPANY, Xenia, Ohio

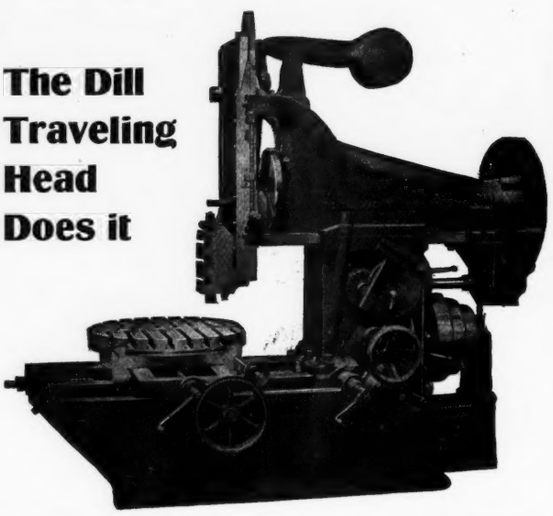
2 in 1—The Dill Slotter

A Standard Slotter for regular work that can be fed to the tool.

A Special Slotter for machining parts too large or of a shape requiring the tool to be fed to the work.

Catalogue tells how.

The Dill Traveling Head Does it

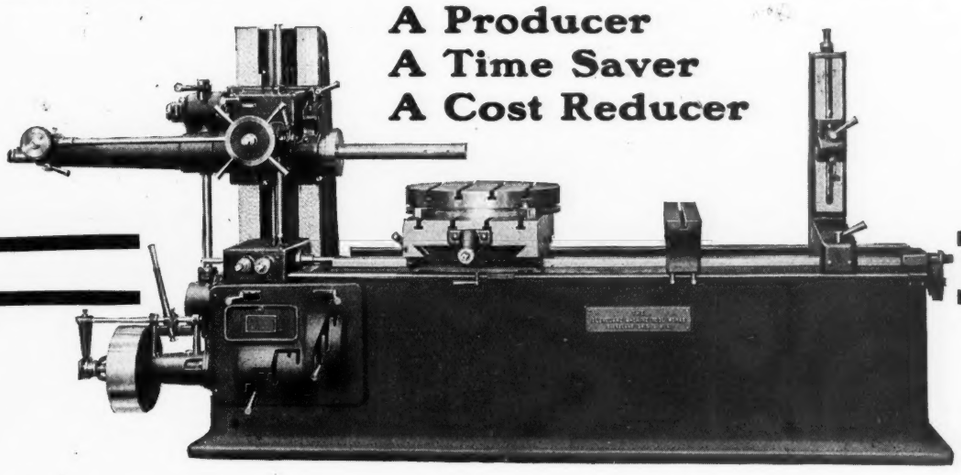


THE DILL SLOTTER PEOPLE
KENSINGTON, PHILADELPHIA, PA.

CLEVELAND

HORIZONTAL BORING, DRILLING AND MILLING MACHINE

A Producer
A Time Saver
A Cost Reducer



In designing this machine, simplicity has been a first factor. There is no complicated mechanism, adjustments are natural, operation easy. Complete change of speed or feed is obtained by moving one handle only, and without stopping the machine; the same pilot wheel operates both slow hand feed and quick traverse of bar.

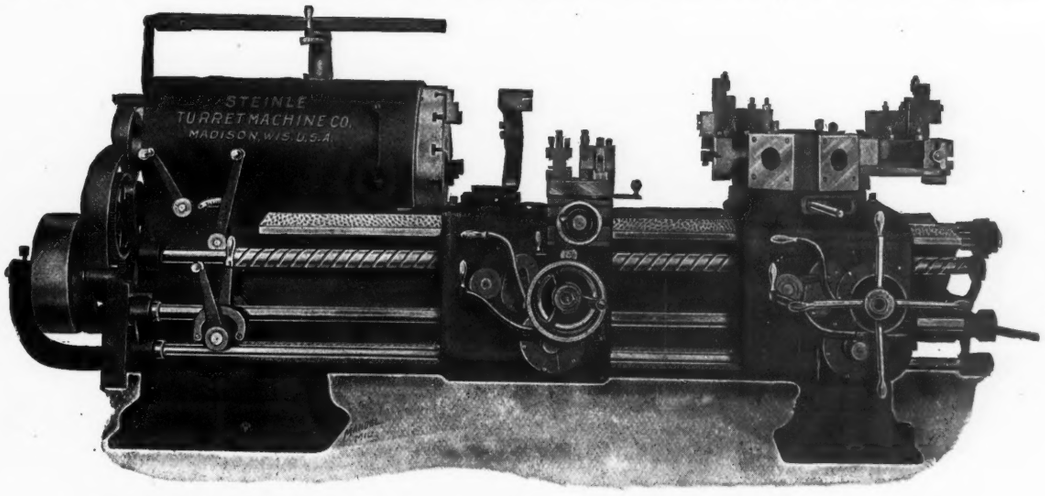
This Centralized Control is one of the advantages that help to make the **CLEVELAND** the most rapid producer of its class.

Regularly furnished with Tapping Attachment and Vertical Feed.

Full description on request.

CLEVELAND MACHINE TOOL WORKS, Cleveland, O., U. S. A.

Reduce the Cost on Duplicate Machine Parts



THE STEINLE FULL SWING SIDE CARRIAGE TURRET LATHE

is one of the economies of the modern shop. Fitted with every operating convenience, it is a labor and time saver, has strength and rigidity for the most accurate work, covers a wide range and is built to meet heavy service. Both carriages operated by power. *Ask for circular with full details.*

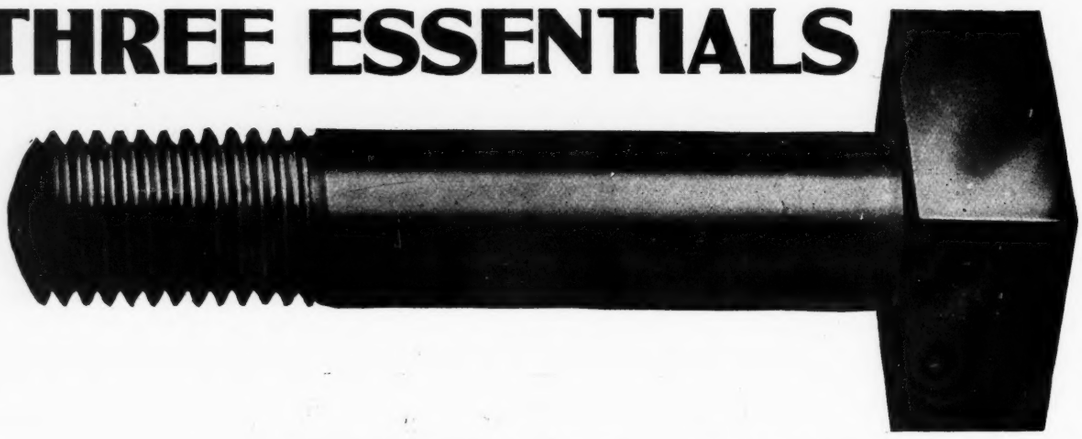
STEINLE TURRET MACHINE CO., Madison, Wis.

SELLING AGENTS

Manning, Maxwell & Moore, Inc., New York.
Atlanta, Boston, Chicago, Cleveland, Detroit, Milwaukee, Philadelphia, Pittsburg, St. Louis, Buffalo, Seattle, Portland, Japan, Mexico.

Ludw. Loewe & Co., A. G., Berlin.
Austria, Belgium, Denmark, France, Germany, Holland, Hungary, Italy, Norway, Roumania, Russia, Spain, Sweden, Switzerland.

THREE ESSENTIALS



QUALITY

Too little attention is given the big factor of QUALITY in buying. There are generally as many grades of quality as bidders and the tendency to regard prices only is altogether wrong.

You will find in our products—first of all—the best grade of material for the purpose—a distinctly different method of manufacture is used and the products are actually stronger and of better finish than others on the market.

PRICE

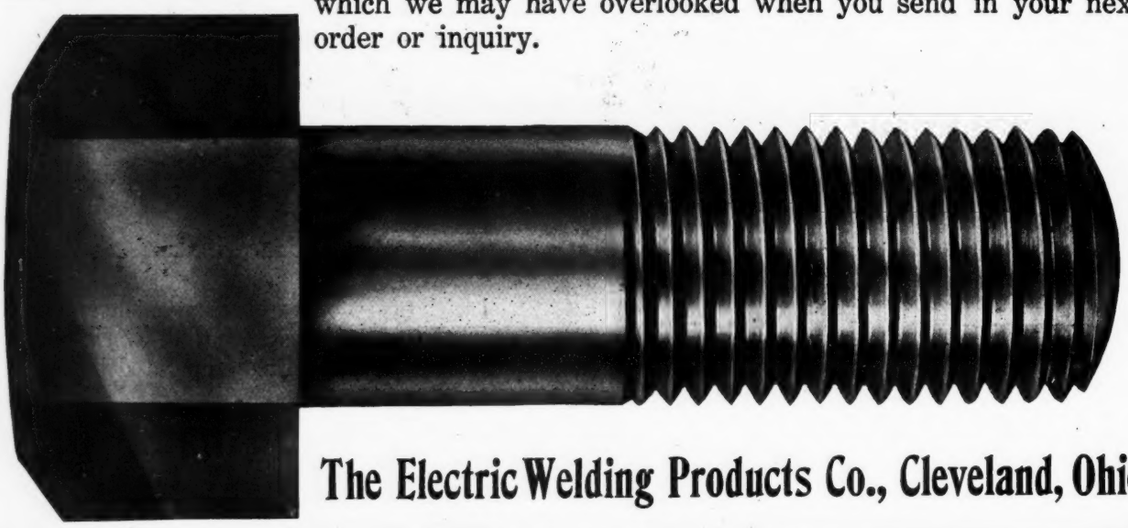
Our large finished steel bolts and screws, drill spindles, vise screw blanks, valve stems, rods and other machine, engine and automobile parts cost less the majority of times than inferior work made by other processes than the electric welding process.

In rare cases the price may be a trifle higher, but the difference in the quality, when considered, far over-balances the difference in prices.

SERVICE

With your co-operation in anticipating your orders as far ahead as practicable, we'll give you the goods when you want them, as we are adding very heavily to our equipment.

You can ask about any other things of importance to you which we may have overlooked when you send in your next order or inquiry.



The Electric Welding Products Co., Cleveland, Ohio

KELLY Adjustable, High Speed Boring Tools and Floating REAMERS

TYPE B

Reduced size cut of turret bar showing boring tool ahead of floating reamer, for light chip, to true up hole in Tough Bronze, "Auto Steel," Tubing, Etc.

Kelly records 1200 hours size and finish.

TYPE C FOR CYLINDERS

REPLACEABLE HIGH SPEED BLADES

Type C for Cylinders 3″ to 12″ diam.
Type B for Turret Work 1″ to 5″ diam.
Carried in stock.

"JONES PAYS THE FREIGHT"

Dear Jones:-

If you will insist on having your engine cylinders reamed with a Kelly Reamer you will find that you will still have "Compression" long after "Mr. Smith's" EMERY-GROUND Cylinders are worn out, in fact, after his engine has run a month, you can "cut circles around him" out in the country.

THE REASON:--The old method--still used by some builders--was, to bore cylinders nearly to size and then GRIND them to size and finish, leaving the pores of the iron filled with EMERY GRIT--making "Emery-Laps" of both piston and cylinder from the start. The KELLY way is to bore the cylinder true to within .005", then REAM with the "floating" reamer, giving size correct to a TEN THOUSANDTH of an inch and an absolutely perfect surface, entirely free from emery grit.

The deduction is obvious, we leave it to you, get the right kind and your "freight bills" will be light.

Hoping this may be of service to you, I am

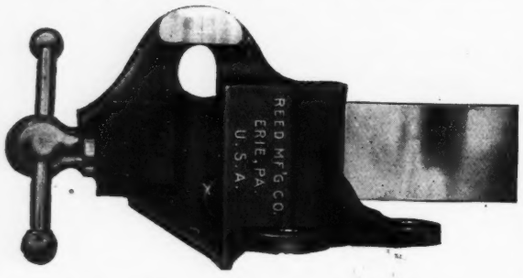
Very truly yours,
W. E. KELLY, President.

The Kelly Reamer Co.

1555-7 Columbus Road (old S. Water St.)
Cleveland, Ohio

CHARLES NEAT & CO., Agents, 112 Queen Victoria Street, London, England.

Long-Life Reed Vises



More vises die from breakage than from any other disease, many not even lasting long enough to wear out.

Reed Vises die a natural death—by wear—unless abused. Their working qualities remain unimpaired because all bearing surfaces are carefully machined to limit gauges, insuring a snug fit. No high spots are left to cause uneven wear or let a shaky hold develop.

The strongest, safest vise to buy is a "Reed"—it's guaranteed.

Send for Catalog "H".

REED MANUFACTURING CO.
ERIE, PA., U. S. A.

BALL

B L C

BEARINGS

Single and Double Row Radial—Thrust—Cone Type and Magneto

German Material **American Make**
Means
High Quality **Low Cost**

Catalogue on request.

B. L. COMPANY, Norwich, Conn.

THE SHIELD THAT SIGNIFIES SUPERIORITY

Sawyer Machinists' Fine Tools

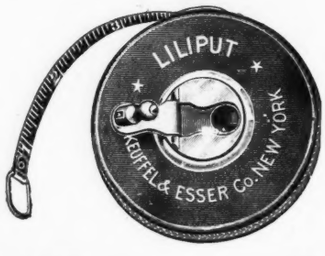
MERIT MADE—SOLD WITH A GENEROUS GUARANTEE

SHARE WITH US THE PROFITS

Ask for details of our co-operative organization. A dollar makes you a stockholder and member—to share with us the profits.

"THE SAWYER SPIRIT"
This Human Interest Story and Catalog sent free.

SAWYER TOOL MFG. COMPANY
FITCHBURG, MASS., U. S. A.



K&E Measuring Tapes

Strong, Durable and Accurate. A Necessary Part of every First Class Mechanic's Equipment.

ANY LENGTH UP TO 500 FEET.

Send for our catalog.

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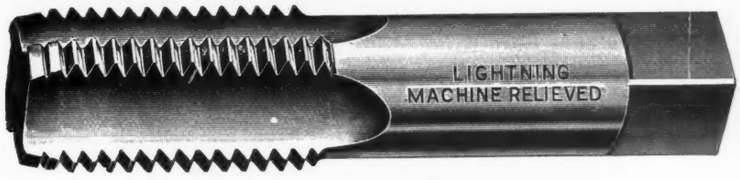
127 Fulton Street, NEW YORK — General Office and Factories, HOBOKEN, N. J.
CHICAGO 111 E. Madison St. — ST. LOUIS 813 Locust St. — SAN FRANCISCO 48-50 Second St. — MONTREAL 252 Notre Dame St. W.
Drawing Materials, Mathematical and Surveying Instruments, Measuring Tape.



TAPS
For All Purposes

Will stand up to the severest requirements. The steel used in them is the best. Hardened and tempered by special processes.

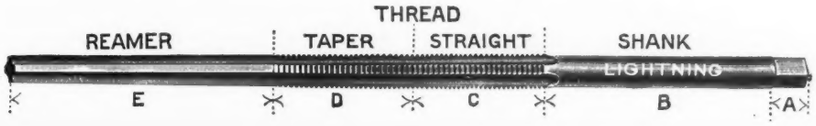
A 3-8 size will tap 40000 nuts. A 7-16 size, 38000 nuts

CATALOG 34 E AND PRICES ON APPLICATION

Sole Makers

Wiley & Russell Mfg. Co., Greenfield, Mass., U. S. A.

British Agents: Selson Engineering Co., 85 Queen Victoria Street, London, E. C.



DRILL VISE WITH JIG ATTACHMENTS

Fig. 2

As an ordinary Vise

Made with Jaws 6", 9" or 12" long.

Always a good Vise for **general shop use** and at same time holds work for duplicate drilling **without the cost of a jig.**

They will pay. More time is consumed in catching work than in drilling it.

In circulars we show special features.

PATENTED

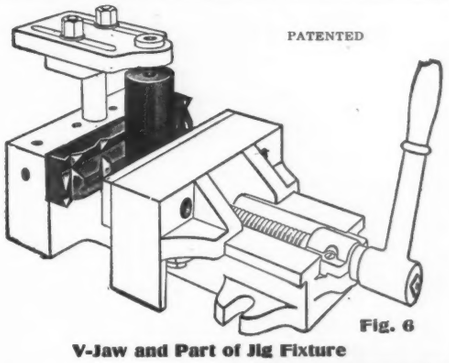


Fig. 6

V-Jaw and Part of Jig Fixture

DRILL SPEEDER

PATENTED

1—Increases the speed of small drills **three times.**
2—Has **safety frictions** to save drills.
3—Has **sensitive feed lever,** with 1½" travel.

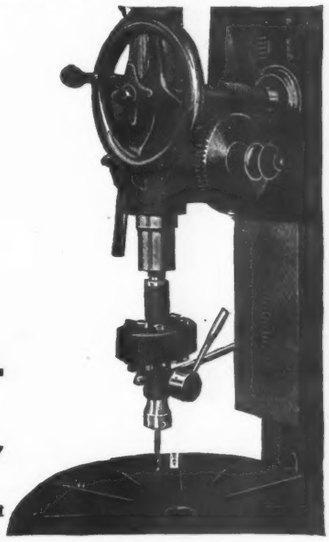
Should be within reach of every Drill Press from

20-INCH TO LARGEST RADIAL

You cannot profitably drill **small holes** in large castings **without it.**

THE GRAHAM MANUFACTURING COMPANY
PROVIDENCE, R. I.

Germany, Schuchardt & Schutte. France, Italy, Spain—Alfred Herbert



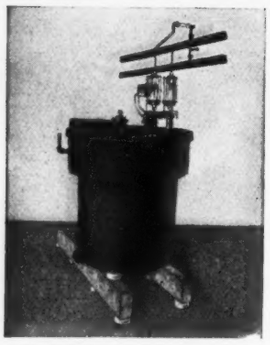
OXYGEN and HYDROGEN

at a fraction of Present Costs

with the I. O. C. SYSTEM

TRADE MARK

TRADE MARK



An I. O. C. Generator for producing Oxygen and Hydrogen.

Pure Gases 100% Efficient
can be produced on your own premises.

The Size of the Plant Can Be Regulated
to suit your needs and can be increased whenever desired.

The System Is Simple, Safe and Dependable

Its Operation Is Practically Automatic

Its Economy Represents a Saving of 75 Per Cent,
in many cases, over the cost of present methods.

The International Oxygen Company owns full American rights of this system, which has been used abroad for the past 10 years with most satisfactory results. The company is prepared to furnish complete equipments to supply any required quantity of gas on your own premises or will supply pure Oxygen and Hydrogen in cylinders.

Send for Illustrated Catalog, which fully describes the I. O. C. System.

INTERNATIONAL OXYGEN COMPANY

PARIS, FRANCE:
39 Rue de Chateaudun

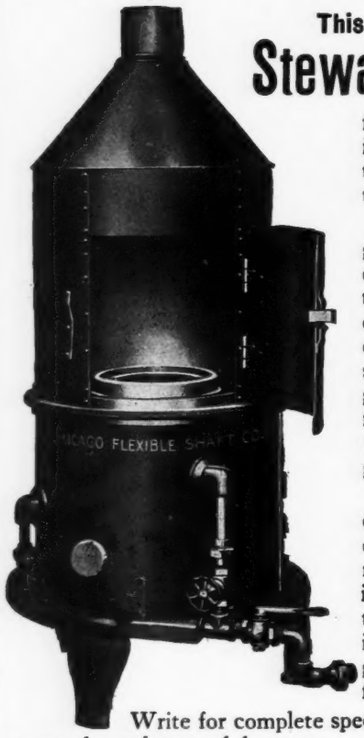
68 NASSAU STREET, NEW YORK

WORKS:
Waverly Park, Newark, N. J.

For Cyanide Hardening

This

Stewart No. 10



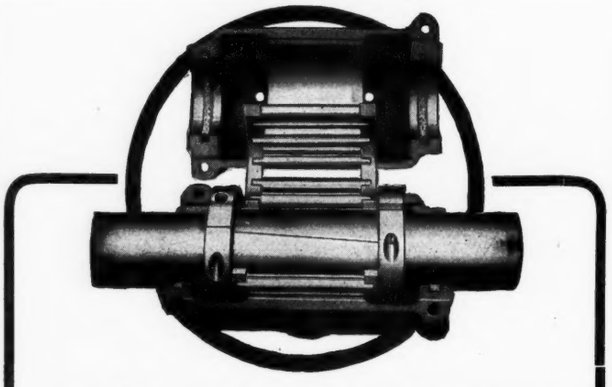
furnace is quite a bit in advance of anything else offered for the purpose.

Bank note engravers, makers of engraved plates, transfer rolls, cutters, dies, springs, chains, etc., where a hard surface without great depth of case is required find this furnace especially good.

The extreme depth of case can be obtained in 17 to 20 minutes. The cyanide may be brought to a hardening heat in 40 minutes, beginning with a cold furnace.

Write for complete specifications and large general catalogue of furnaces.

CHICAGO FLEXIBLE SHAFT COMPANY
149 La Salle Ave. **CHICAGO**



25 to 65% saving in your friction load by using

SELLS ROLLER BEARINGS

yet they cost 50% less than any other Roller Bearing.

Just read some of the advantages of this Sells construction.

SELLS ROLLER BEARINGS are universal in adaptation (any Sells Bearing can be fitted to any hanger, post hanger, or pillow block of a corresponding size).
SELLS ROLLER BEARINGS are split throughout, applied as easily as a split pulley.
Shaft is protected from all wear by steel split bushing.
SELLS ROLLER BEARINGS can be bushed to fit different diameters of shafts.
All end thrust is eliminated (Sells are full floating type).
SELLS ROLLER BEARINGS have self-contained roller structure, eliminating all friction between rolls and insuring that rolls will run parallel with box at all times.
SELLS ROLLER BEARINGS have a rotating surface, against which ends of roller structure run.

Write now for booklet.

MANUFACTURED BY

ROYERSFORD FOUNDRY & MACHINE CO.

Manufacturers of
Power Transmission Machinery and Punching and Shearing Machines

54 North 5th St., PHILADELPHIA, PA.

EUROPEAN OFFICE:—Theodore Butler, Ltd.,
149 Queen Victoria Street, London, E. C.

"ROLLERINE" A high grade lubricant especially compounded for Roller and Ball Bearings.

Defective Castings Made Perfect

Blowholes, sand holes, porous or spongy spots in iron or steel castings can be easily, quickly, cheaply and permanently repaired with J-M Ferro Compound. It metallizes and becomes a permanent part of the casting.

J-M Ferro Compound

can be finished with a fine file or an emery wheel when hard, and cannot be told from the iron itself, as it has the same color.

J-M Ferro Compound comes in powdered form and is used by mixing to the consistency of stiff putty and applying with a metal or hard wood paddle, a trowel, or by hand.

Write nearest branch for booklet.

H. W. Johns-Manville Co.

Baltimore	Cleveland	Los Angeles	New Orleans	San Francisco
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For Canada:—THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED
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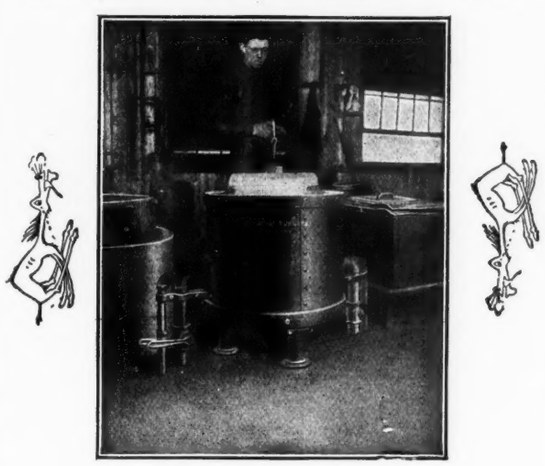
ROCKWELL
Cylindrical Hardening Furnaces



Hardening Milling Cutters

For heating high speed steel reamers, taps, drills, etc., for hardening. The work is suspended in the central portion of the heating chamber through suitable openings in a black lead cover. The flame enters at a tangent and does not impinge on the stock. A high uniform temperature can always be maintained under easy control.

WRITE FOR BULLETIN "G-11"

Rockwell Furnace Company
CONTRACTORS AND BUILDERS

26 Cortlandt Street, NEW YORK — Fisher Building, CHICAGO

Pressed Steel Pulleys

After a split bushing is bored true, the two halves should be placed on the shaft in the same relative position as that in which they were finally finished.

But owing to the great amount of trouble pulley users have had in not being able to determine which was the correct way of putting bushings together, we have made Philips Bushings so they can only be placed together one way.

Here's how this is accomplished

Simply by casting a small lug on one-half section (see it on the half section in my right hand)—and a corresponding slot in the other half.

And it is because these bushings so accurately fit the shaft that we can obtain the perfect compression which the Philips possesses. This grip is made even stronger by the unusual width of the cast iron hub.

Now, this is only one of the many advantages of the Philips Pulley. That's just the reason we want you to send us now the attached coupon, so we can mail you all the others.

Write us today.

Philips Pressed Steel Pulley Works
341 Glenwood Avenue, PHILADELPHIA, PA.

We are in position to furnish special heavy duty pulleys up to 48 x 16, any size bore. These pulleys are especially adapted for drop hammers, air compressors and cement plants, and can be supplied with either solid or split hubs.

COUPON

GENTLEMEN:—Send me booklet and information about the Philips Pressed Steel Pulley.

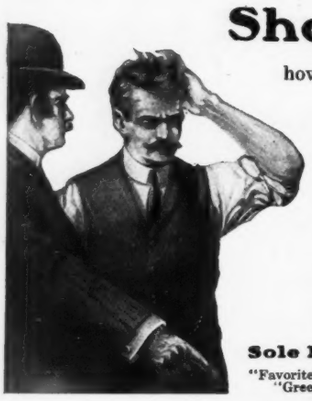
Name.....

Firm.....

Firm Address.....

Business.....

MACHINERY, Aug.



Show Your Shop Foreman

how to increase efficiency by cutting out the lost motion in turning nuts by using the

FAVORITE REVERSIBLE RATCHET WRENCH

Its motion is continuous, doing away with the half turn and a fresh hold. There is no slipping, consequently no damage to the nuts. Construction is simple, and price low.

Let us tell you all about the "Favorite."

GREENE, TWEED & CO.

Sole Manufacturers **109 Duane St., New York**

"Favorite" (Registered trade mark in United States.)
"Greentweed" (Registered trade mark in Germany.)

Selling Agent for Germany: Arthur Kayser, Berlin.
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In Gas Engines

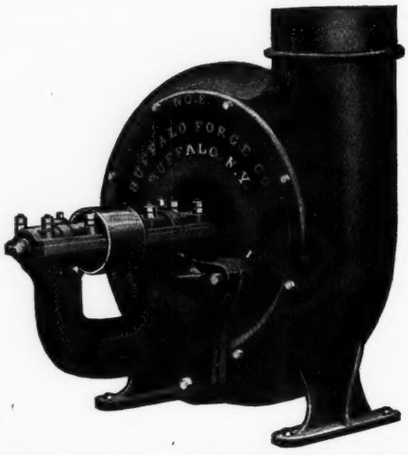
You can reduce friction, increase compression, and make binding of piston impossible, by using

Dixon's Flake Graphite

This is the one lubricant that the heat of the cylinder cannot carbonize. Flake Graphite attaches itself directly to the metal surfaces and stays with them. Write us.

Joseph Dixon Crucible Co.

Jersey City, N. J.



BUFFALO EXHAUSTERS

for removing refuse from emery and buffing wheels, dust from tumbling barrels, and gases, smoke and fumes from buildings.

The shell is a solid one-piece casting, very strong and rugged. Has no joint at point of high pressure to leak. Side plates are securely bolted on.

Large oil ring type bearings and balanced fan wheel ensure true, smooth running at all speeds.

Will maintain suction pressures up to six ounces. Types are made for discharging horizontally, from top or bottom; and vertically, either up or down.

Catalog No. 178-LO on request. Write for it.

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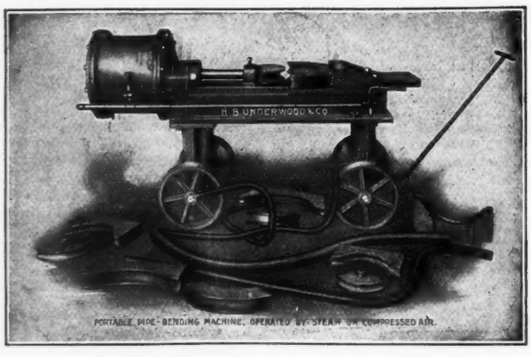
Pittsburg Cincinnati Charlotte Los Angeles Montreal



PORTABLE PIPE-BENDING MACHINE, OPERATED BY STEAM OR COMPRESSED AIR.

PORTABLE TOOLS

PORTABLE PIPE BENDER

Operates with air or steam at 80 to 100 pounds pressure. Bends cold without filling or flattening. Dies furnished for pipe ¾" to 2" diameter. Machine works rapidly and economically. Write for catalogue.

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The "American"
Gas Furnaces and Heating Machines

are warranted to secure the best results and we guarantee all our apparatus for the work for which we recommend them. The Improvement of Mechanical Heating Processes has been our specialty for over thirty years.

What We Make:

Pressure Blowers
Gas Blast Furnaces
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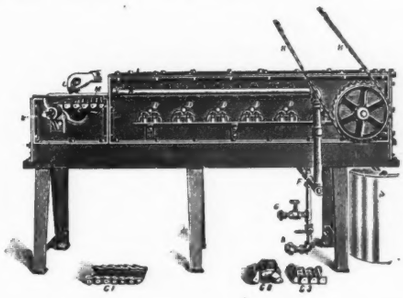


Heating Machine No. 4

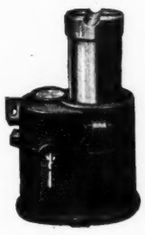
For continuous heating of large quantities of small steel pieces for hardening or annealing.

Write for catalogue and information.

AMERICAN GAS FURNACE COMPANY
24 JOHN STREET GAS ENGINEERS AND MANUFACTURERS NEW YORK, N. Y.

DUDGEON HYDRAULIC JACKS

USED IN ANY DESIRED POSITION



Remarkable control is exclusive to the Dudgeon "Universal" Hydraulic Jack—the only vertical type jack with a double pump; the only jack that can be used horizontally with lever working at any angle and the only jack provided with valves and pistons that will perform each other's duty in case of necessity.

Jacks and Pressure Pumps for nearly every purpose—efficient and very strong but not unnecessarily heavy nor cumbersome.

Write for the catalog of everything hydraulic.

MADE ONLY BY

RICHARD DUDGEON BROOME and COLUMBIA STREETS, NEW YORK

The
Banner Wrench

Don't be put off with an imitation wrench that the dealer says is "just as good as Coes"—there are no "just as goods" made. If there were, "Coes" Genuine Wrenches would hardly have held top place for more than half a century.

There are no wrenches so thoroughly adapted for varying lines of work as "Coes," no wrenches that have the strength of "Coes," the few parts, the careful finish, or the wearing qualities of "Coes"—there are no wrenches made as straight or sold as straight as "Coes."

If your dealer has some other style wrench he wants to sell you because it's "just as good"—put it beside the "Coes" Genuine and make him prove it.

Five Styles and Fifty Sizes—a wrench for every need.
Apply to your dealer or direct to

COES WRENCH CO., Worcester, Mass.

AGENTS: JOHN H. GRAHAM & Co.
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Copenhagen, O. Denmark.

AGENTS: J. C. McCARTY & Co.
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Cloth Pinions

Silent Pinions that are Strong and Durable

The need of a long lived, silent pinion, with great strength for electric motor drive, developed the cloth pinion which is furnished for general use or, when desired, in combination with General Electric Company back geared industrial motors.

Cloth pinions and gears are cut from blanks consisting of a filler of cotton held under a pressure of several tons per square inch by steel side plates and threaded rivets or sleeves.

Carefully consider their advantages which follow:

Higher tooth strength than any other non-metallic pinion. Breaking tests on testing machines and in service have proven this quality beyond the shadow of a doubt.

Long life. Pinions in use in various industries have been in daily operation for over two years without showing appreciable wear.

Noiseless operation. Employees' best work cannot be obtained where excessive noise is present.

Freedom from damage when exposed to dampness, dryness, heat, cold or vermin. The bursting, charring or drying of other non-metallic pinions and their destruction by rats or mice are well known.

Elasticity of teeth sufficient to absorb shocks liable to break cast iron or deform brass. The slight elasticity of these pinions makes it safe to use them in any service within the limits of strength of similar cast iron gears. Meshing teeth come to a good bearing across full width of face and absorb the shock due to a rapid variation of torque.

Self lubrication. Pinions are soaked in oil after being cut and in use acquire a durable surface with a metallic lustre.

All sizes of gears and pinions cut to 14½ degree involute system according to B & S standard can be furnished promptly.

General Electric Company

Largest Electrical Manufacturer in the World

Principal Office: Schenectady, N. Y. **Sales Offices in the following Cities**

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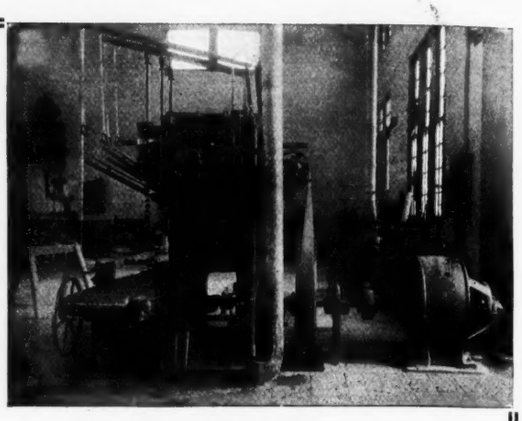
2978

You can arrange the machines in your shop to the best advantage when they are each equipped with

Westinghouse Motors

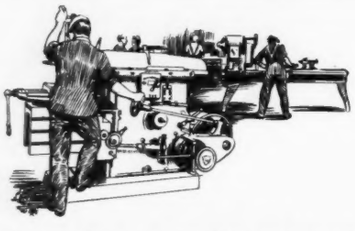


Westinghouse Motor driving Machines in Woodworking Department of a Railroad Shop.

The placing of individually motor driven tools is only a question of convenience—there is no hard and fast line shafting to determine their position. Once installed their location can be changed at any time without trouble, a couple of flexible wires being all that are needed to supply the power.

Westinghouse Electric & Manufacturing Co.

Atlanta Buffalo Denver Los Angeles Philadelphia Salt Lake City
Baltimore Chicago Detroit New Orleans Pittsburg San Francisco
Boston Cincinnati Kansas City New York St. Louis Seattle
Westinghouse Electric & Mfg. Co. of Texas, Dallas and El Paso, Texas.
Canada: Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Mexico: Compania Ingeniera, Importadora y Contratista, S. A., Successors to G. & O. Braniff Co., City of Mexico.



MAKE it easy for your machine tool operators to get the right speed for each operation on all kinds of work. It means more work from every machine.

The Reliance Adjustable Speed Motor offers a convenient method of speed control which encourages operators to make proper speed changes as often as the work demands. With Reliance Motors there is no running just below or above the speed that will produce the best results. Wide ranges and accurate speed adjustment make possible the proper speed for every kind of work and every class of tool. This means maximum output and minimum production cost under all manufacturing conditions.

The Reliance method eliminates the electrical controller and complicated wiring. Turning the hand wheel shifts the motor armature, causing the speed to change smoothly but quickly to the exact point desired. The motor is just as simple to install and operate as any constant speed motor.

If desired, rugged automatic starters may be used which require simply the throwing of a switch, or the pressing of a button. All starting conditions are automatically taken care of, and every possibility of abuse to the motor or starting equipment is eliminated.

Write today for a copy of our Folder 10-M, and learn more about the advantages of Reliance Motors for your work.

We can also furnish Constant Speed Motors for either D. C. or A. C. circuits.

Reliance Electric & Engineering Co.
1056 Ivanhoe Road Cleveland, Ohio

SPRAGUE
FLEXIBLE STEEL ARMORED
TOOL HOSE

NO CHAFING — NO KINKING — NO BURSTING
FITTING BLOWOUTS ELIMINATED
RENEWAL BILLS REDUCED

SPRAGUE FLEXIBLE STEEL ARMORED PNEUMATIC TOOL HOSE ATTACHED TO CHIPPER

Ask for Descriptive Pamphlet No. 51618.

SPRAGUE ELECTRIC WORKS
OF GENERAL ELECTRIC COMPANY
Main Offices:
527-531 West 34th Street New York, N. Y.
Branch Offices in Principal Cities

MOTORS TRANSFORMERS GENERATORS

WINDING FIELD-COILS FOR SMALL MOTORS

CROCKER WHEELER
SMALL MOTORS

It may be assumed that the average manufacturer of today realizes the advantages of individual motor drive for his machines over the older belt-and-shafting method. Having learned how the 25% (more or less) of his power which is consumed in the belt-and-shafting method of transmission can be saved and added to his profits, his next task is to choose which of the many advertised motors to use. As they all differ more or less, it may be assumed that one of them is more desirable than the others. It is, however, difficult to judge the quality of a motor by its external appearance, and as its performance and quality depend on a hundred small details of design and construction, the only real assurance of quality is the record of the motor in question, and the reputation of the Company back of it. Also it must be considered that the selection of the proper size and style of motor, for the particular work in hand, requires expert judgment, and he should procure his motor from a concern that is capable of advising him on these important points.

The Crocker-Wheeler Company makes a specialty of building small motors from 1/20 H.P. upwards, and having tens-of-thousands of them in satisfactory operation, this Company is especially qualified both to advise as to the kind of motor and to supply just the motor required. In this month's issue of MACHINERY, a descriptive article appears, giving the details of construction of these Crocker-Wheeler small motors, showing the care which is taken in every process of their construction.

Write for bulletin 118-R on Small Motors

CROCKER-WHEELER COMPANY

OFFICE AND WORKS: AMPERE, N. J.

Boston Birmingham Chicago Cleveland Denver Detroit Newark New Haven New York Philadelphia Pittsburg Syracuse

PATENTED.

STRENGTH—LIGHTNESS—PERFECT BALANCE

ASK YOUR DEALER FOR THE

"AMERICAN" PULLEY

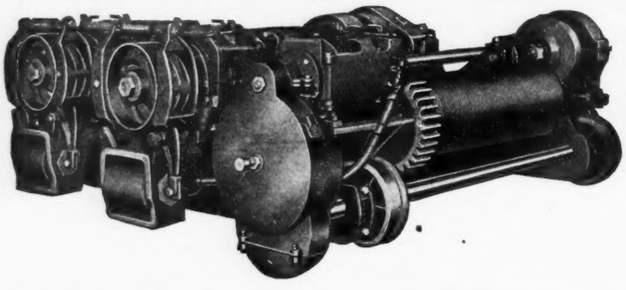
It is not only the best pulley made, but is a model for time, trouble and money saving devices of its class. Saves power wherever installed, is safe under high speed and weighs about half as much as a cast iron pulley of equal size. Write for prices—or apply to any dealer.

Made in sizes 6" to 60" diameter. 2" to 36" widths.

THE AMERICAN PULLEY COMPANY

Office and Works: PHILADELPHIA, PA.

WAREHOUSES: New York, 203 Lafayette Street Boston, 165 Pearl Street Chicago, 124 S. Clinton Street



TOLEDO CRANES

HAND AND ELECTRIC FOR ANY SERVICE

STEEL STRUCTURES

Experienced Engineers.
Old and Tried Crane Design.
Admitted the best by people who know.

THE TOLEDO BRIDGE AND CRANE COMPANY

TOLEDO, OHIO

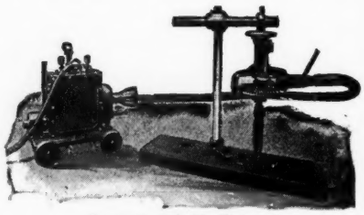
SALES AGENTS—M. A. Beck, Milwaukee, Wis. C. E. Stamp & Co., Cleveland, Ohio. The Cincinnati Iron and Steel Co., Cincinnati, Ohio. The Fairbanks Co., Philadelphia, Pa.

Bend or Twist Stow Flexible Shafts into Any Working Position.

Portable Electric Outfit

The service given and power transmitted are always the same. Unlimited convenience in grinding, boring, drilling, polishing, etc., is yours with the installation of a *Stow Flexible Shaft Outfit*, and the shop that is without it is missing many opportunities for turning losses into revenue.

All styles and sizes shown in the catalogue.



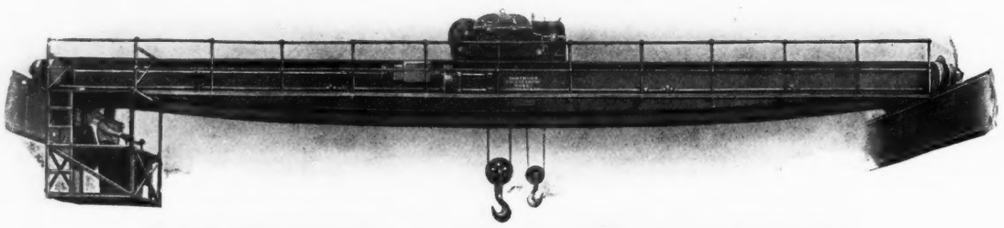
Compressed Air Drive

STOW FLEXIBLE SHAFT COMPANY,

26th and Callowhill Streets
PHILADELPHIA, PA., U. S. A.

NORTHERN ENGINEERING WORKS,

DETROIT, MICH. U.S.A.

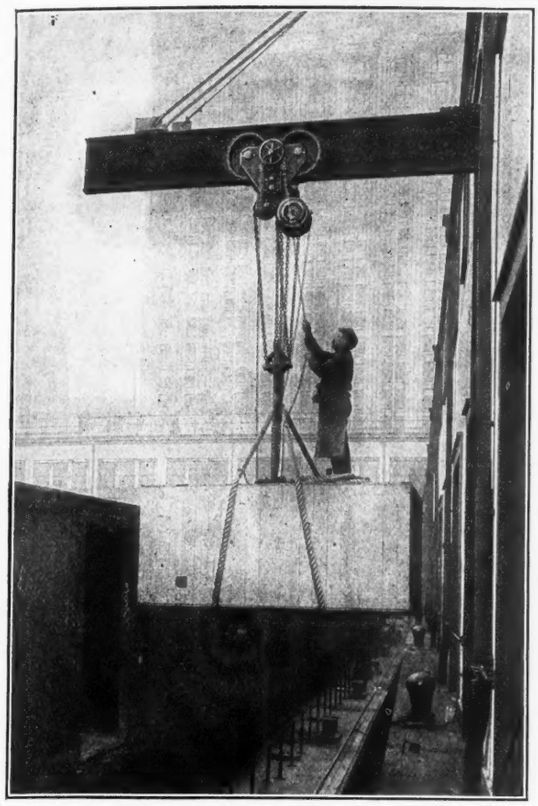


ELECTRIC AND HAND TRAVELING CRANES

JIB CRANES - ELECTRIC HOISTS - AIR HOISTS - TROLLEY SYSTEMS

New York, 120 Liberty Street Chicago, 539 Monadnock Block

THE TRIPLEX BLOCK



A ten-ton Triplex Block hung from a geared trolley and used for loading and unloading cars on floats lying alongside a pier.

The Triplex Block on a trolley offers the cheapest method of loading and unloading ever devised

ONE man, with a Triplex Block hung from a trolley and running on an overhead track, can load or unload cars quickly, cheaply, and with absolute safety.

All the parts of the Triplex Block subject to shock or strain are made of steel.

No block leaves our works without passing tests more rigid than those of actual service—and in thirty-five years we have learned more about building and testing chain-blocks than is known elsewhere.

Triplex Blocks { **16 Sizes:** One quarter of a ton to forty tons. **300 Active Stocks** all over the United States.

Let us send you the "Book of Hoists."

The Yale & Towne Mfg. Co.

Also Duplex Blocks, Differential Blocks and Electric Hoists

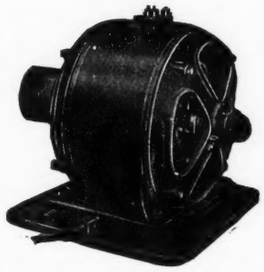
The Makers of Yale Products
Locks, Padlocks, Builders' Hardware, Door Checks and Chain Hoists.

9 Murray Street, New York
Local Offices: Chicago, Boston, San Francisco.

Eck Dynamo and Motor Co.

BELLEVILLE, NEW JERSEY

Specialists in the manufacture of



ELECTRIC MOTORS

for application to all classes of machinery.

1-32 to 20 H. P.

Tell us your needs.

BROWN PYROMETERS

do away with guesswork as to temperature of your furnaces.

THE BROWN INSTRUMENT COMPANY

(Established 1860) PHILADELPHIA, PA.

BRANCHES: Pittsburgh and Chicago.
AGENTS: C. W. Burton, Griffiths & Co., London Eng.

ROTHMOTORS—

—Have been on the market for 15 years.

—Have met with marked success where used.
—Are made in standard and special forms to suit the requirements

for CONSTANT SPEED
for ADJUSTABLE SPEED
for GRINDING PURPOSES
for POLISHING PURPOSES

Roth Bros. & Co.

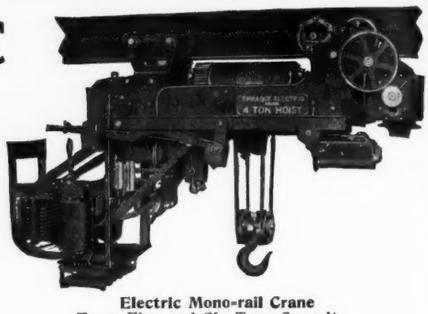
1394 W. Adams St., CHICAGO, ILL.

New York Office, 136 Liberty St.

SPRAGUE ELECTRIC HOISTS

INCREASED PRODUCTION TIME AND LABOR SAVED

The Mono-rail Crane shown is equipped with direct or alternating current motors for hoist and travel. The runway is a commercial I-beam, and crane will take curves of ten feet radius. It will lift to within thirty-three inches of runway and can be supplied with either open or closed cage.



Electric Mono-rail Crane
Four, Five and Six Tons Capacity

Illustrated Pamphlet No. 23318 on application.

ELECTRIC HOISTS ELECTRIC SHOVELS ELECTRIC WINCHES MONO-RAIL CRANES

SPRAGUE ELECTRIC WORKS

OF GENERAL ELECTRIC COMPANY

Main Offices: 527-531 West 34th Street - - New York, N. Y.

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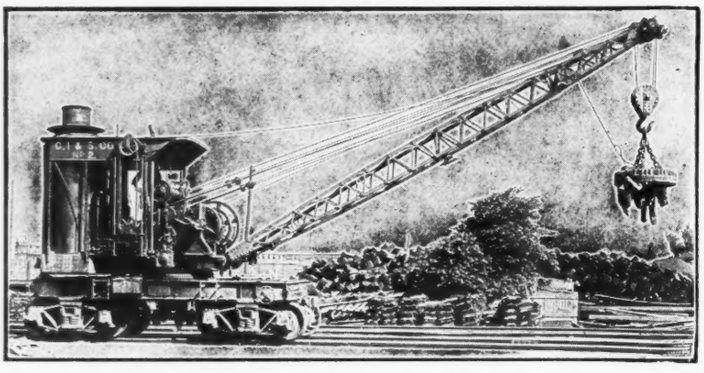


"BROWNHOIST" Locomotive Cranes

This shows a "Brownhoist" Crane equipped with lifting magnet, handling pig iron for Columbus Iron & Steel Co., Columbus, O. These cranes will handle any material, as they are capable of using either the grab bucket, bottom block or lifting magnet.

CATALOGS AND FULL INFORMATION SENT ON REQUEST

THE BROWN HOISTING MACHINERY CO.
CLEVELAND, OHIO

1 to 15 TONS

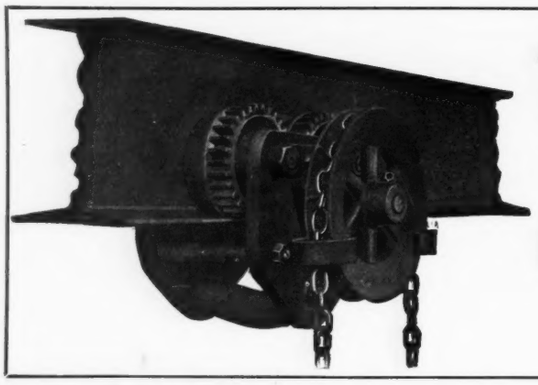
2 to 20 H. P.

PNEUMATIC GEARED HOISTS

DURABILITY IS WORTH SOMETHING TO YOU AND MORE TO US

PNEUMATIC MOTORS

DETROIT HOIST AND MACHINE CO.
DETROIT, MICH.



Trolleys

MARIS BROS.
PHILADELPHIA
PA.

HOISTS, New Patent Whip

Patent Friction Pulleys
NONE BETTER MANUFACTURED BY
VOLNEY W. MASON & CO., Providence, R. I., U.S.A.

You Can't Get Stuck with this Ratchet.

Two inches of motion at end of handle, IN ANY DIRECTION, will drive the Drill.

Patented Nov. 8, 1898, Sept. 29, 1900.

When the other ratchets you have are useless for lack of room to move the handle, get an "ARMSTRONG UNIVERSAL" and it will do the job.

Write for Catalog.

Armstrong Bros. Tool Co., "The Tool Holder People."
313 N. Francisco Ave., CHICAGO, ILL., U. S. A.

See our Tool Holder ad., page 116.

GEARING

Four compact books covering this important subject completely. **No. 1—Worm Gearing. No. 15—Spur Gearing. No. 20—Spiral Gearing. No. 37—Bevel Gearing.** All units in MACHINERY'S Reference Series, 25 cents each.

FRANKLIN PORTABLE CRANE and HOIST

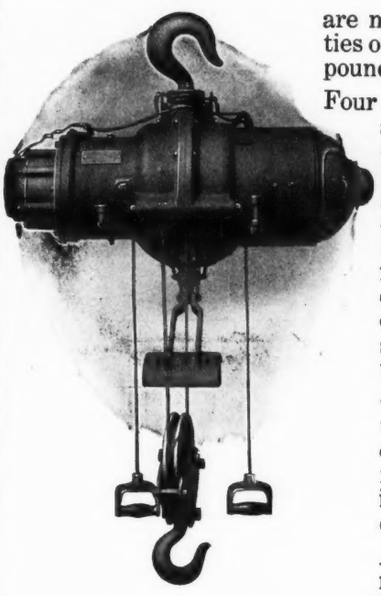
Get a line on this labor saver. It is Samson turned errand boy—a portable crane that will go to any part of the plant, lift any load up to three tons weight and transport it quickly and safely to any point desired. It is an auxiliary to the overhead crane or an able substitute. Does the work of twenty men in the day—compact, durable, adaptable—handled by one man, and a necessity for the busy shop.

BOOKLET ON REQUEST

The Franklin Portable Crane and Hoist Co.

Franklin, Pennsylvania, U. S. A.

Shepard Electric Hoists



are made in capacities of 1000 to 40,000 pounds.

Four hundred types are afforded by different combinations of standard machines, so we are able to meet most any requirement without going into special apparatus.

Gearing, controller and all other parts are fully enclosed in dust tight cases.

All gears are run in oil baths.

Write for Electric Hoist Hand Book.

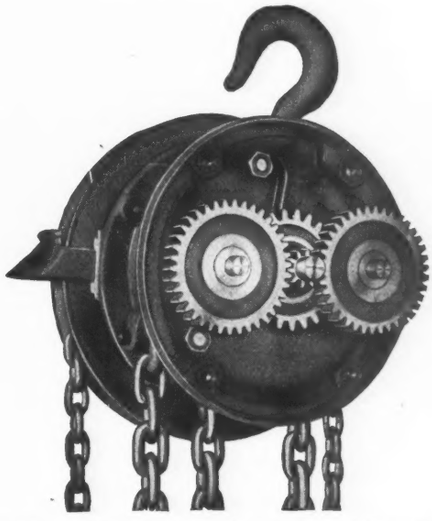
Shepard Electric Crane & Hoist Co.

Main Office and Works: Montour Falls, New York, U. S. A.

New York Philadelphia Pittsburg Chicago
Toronto Atlanta San Francisco

"Peerless" Hoists

NEVER DROP A LOAD



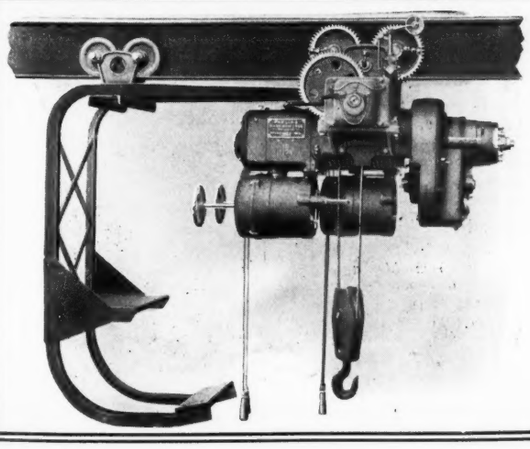
They are noiseless in operation, lift quickly and hold automatically at any desired point of travel, without slipping or jamming. The sustaining brake and heat treated central pinion prevent accidents. Balanced gear train, high grade construction and simple mechanism throughout insure long service.

500 TO 40,000 LB. CAPACITIES.

Sent on 30-day Trial. Catalog "H."

Edwin Harrington, Son & Company, Inc.

PHILADELPHIA, PA.



Traveling Electric Hoists

"P & H" hoists represent nearly a quarter of a century's experience in the designing and building of this class of apparatus.

Built in many standard types, one or two motors, for cage or floor control, in capacities of from ½ to 6 tons. Indoor or outdoor service. Special hoists designed and built to meet unusual conditions.

Ask for bulletin 18.

PAWLING & HARNISCHFEGER CO.

MILWAUKEE, WISCONSIN

BRANCHES—New York, 45 Broadway. Chicago, Monadnock Block. Philadelphia, Stephen Girard Bldg. Pittsburg, Fidelity Bldg. New Orleans, 533 Baronne St. Portland, Ore., Spalding Bldg. AGENTS—H. N. Steinberger, Denver. L. Heynemann, San Francisco. Bowman-Blackman Machine Tool Co., St. Louis.

The Steel Used in Lincoln-Williams Twist Drills is Exactly Suited to High-Speed Work

Just as the steel used in cheap jack-knives would be unfit for fine razors, so is the steel used in the ordinary drill unfit for high-speed drilling.

We could use *cheaper* steel, we could spend about half what we do in *tempering* it, and we could make our drills about half as *good* as they are, but we *don't intend to.*

We want every drill that bears our name to be a credit to *us* and the *user,* and still more we want every drill to do its work unfailingly and secure for us more customers for drills of the *same kind.* That's why we have searched the country for *steel* good enough to put into Lincoln-Williams High-Speed Drills in the first place, and then tempered this steel so that it is *exactly suited to high-speed work.*

Try a couple of our drills as a "test" and see how freely they cut without forcing. Prices and full details sent on request.

LINCOLN-WILLIAMS TWIST DRILL CO.

TAUNTON, MASSACHUSETTS

Carpenter's Taps and Dies--41 Years' Reputation

When you buy Screw Plates, Dies, Taps, screw cutting tools of any kind, look for the Carpenter trade mark—it is your guarantee of quality.

Screw cutting tools furnished in every size and style desired. Large stock always on hand—prompt shipments assured.

Not cheap tools—but the best you can buy—quality and price guaranteed.

Complete catalogue on request.

The J. M. Carpenter Tap and Die Company

PAWTUCKET, R. I., U. S. A.

FOR END THRUST ON ROTATING SHAFTS

USE

AUBURN BALL THRUST BEARINGS

to decrease the power consumption and to increase the life of the machine. Auburn Patented Four Point Contact Cone Principle and the use of the finest steels make this the most durable ball bearing for end thrust. *Write for Bulletin 7.*

Auburn Steel, Brass and Bronze Balls

Superior Facilities for making Hardened Steel Plates, Discs, Washers and Rings. Write for particulars and prices.

Auburn Ball Bearing Co., 33 Elizabeth St., Rochester, N. Y.

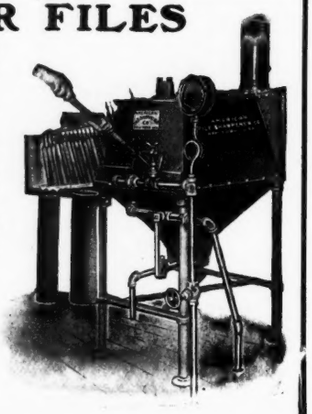
EUROPEAN REPRESENTATIVES: Andrew & Suter, 23 Goswell Rd., London, E. C., Eng.

SAVE YOUR FILES

One Concern Saved 180 Dozen Files in 10 Months

For ten months previous to the installation of an *American File Sharpener,* 307 dozen files were needed for the machine shop. During the ten months following the installation, the order dwindled to 127 dozen—same amount of work being done.

Let us give you some idea as to what one of these machines will save you.



AMERICAN FILE SHARPENER CO.

287 Broadway, NEW YORK

YOU CAN'T buy a better TOOL MAKER'S FILE than the "American Swiss"—and we're willing to prove it.

There is just one way to prove the superiority of a file—use it in your own shop, on your own work. We might keep right on telling you for months to come that "American Swiss" files are specified by the expert worker; that our special hardening process insures hard, tough teeth and a uniform temper; that they are guaranteed to produce results that meet any comparison—but, *one day's use will do more to convince you* than reams of printed argument.

Ask us to send you sample files; or, better still, buy a few for your special needs from our nearest distributor. We'll stand or fall by your verdict.

AMERICAN SWISS FILE & TOOL CO.

24 John Street **NEW YORK, N. Y.**

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E. P. REICHHELM & CO., Inc., 24 John St., New York.
C. W. MARWEDEL, 76 First St., San Francisco, Cal.
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THE MACHINISTS' SUPPLY CO., 324 Third Ave., Pittsburg, Pa.
THE MACHINISTS' SUPPLY CO., 19 No. Jefferson St., Chicago, Ill.
THE BOYER-CAMPBELL CO., 64 Congress St., Detroit, Mich.
WHITE TOOL & SUPPLY CO., 1313 Sixth St., N. W., Cleveland, O.
CHAS. A. STRELINGER CO., 96 Bates St., Detroit, Mich.
WM. McCLELLAN & CO., 3444 Hamilton Ave., Cleveland, O.
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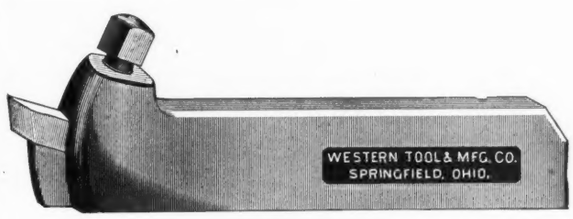
UNITED HARDWARE & SUPPLY CO., Erie, Pa.



Patented April 24, 1900

Champion Tool Holders

Drop Forged.
Support under Cutter.
Big Head. Big Cut.
Big Steel Set Screw.

Champion Tool Holders—27 Kinds.

POSITIVELY NOTHING BETTER MADE.

"Western" Portable Vise Stands

are very substantially built, with a broad, solid base, and their rigidity renders them especially suitable for filing purposes. These stands, furnished with or without extra shelf, will carry tools and vise at once to the work, saving time and unnecessary steps.

No tool room, assembling room, repair shop, etc., can afford to be without one or more of these convenient and useful stands.

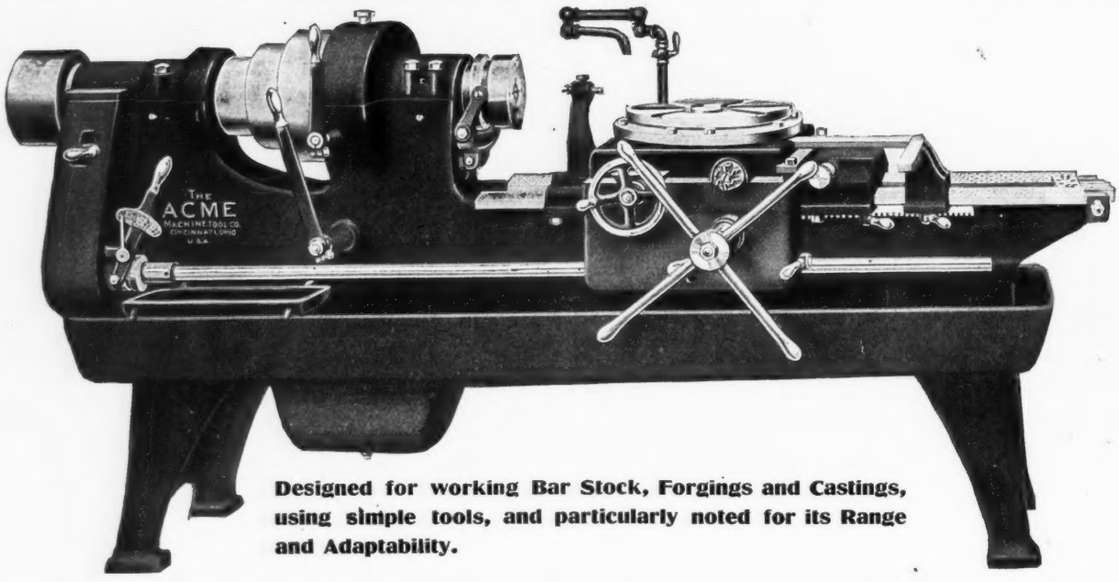
Send for the complete catalogue, Shop Furniture, Small Tools, Power Hack Saws, Lathe Dogs, etc.

Positively the only Mandrel Which will Completely and Entirely Fill the Hole.

THE WESTERN TOOL & MFG. COMPANY, Springfield, Ohio

FOREIGN AGENTS—Alfred Herbert, Coventry, England; France; Italy, etc. Chas. Churchill & Co., Ltd., London, England, Manchester, etc. De Fries & Co., Dusseldorf, Germany, etc. A. V. Lowener, Copenhagen, Stockholm.

New Combination Turret Lathe



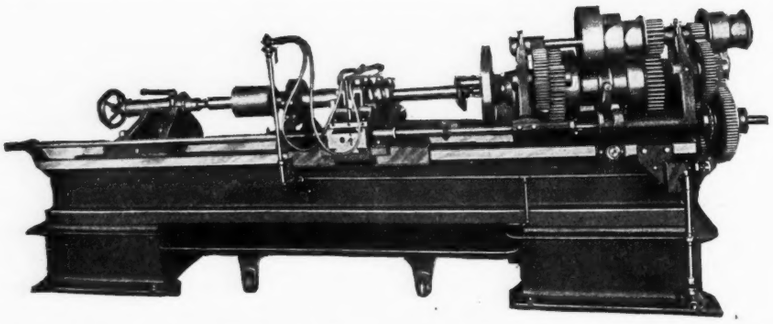
Designed for working Bar Stock, Forgings and Castings, using simple tools, and particularly noted for its Range and Adaptability.

The single piece head and bed casting, together with method of mounting the turret on a very substantial cross slide, assure the greatest possible rigidity. The turret locking bolt is placed at the front end of the slide, directly under the cutting tool, and works in hardened, ground taper bushings let into the solid turret. This construction has been adopted because it gives a practically solid tool support, the pressure of the cut on the tool always being downward.

Special Chuck, Roller Feed and other features of this machine are described in our latest bulletin—may we send it?

THE ACME MACHINE TOOL CO., Cincinnati, Ohio

Automatic Threading Lathes have reduced the human element in attendance to the time minimum

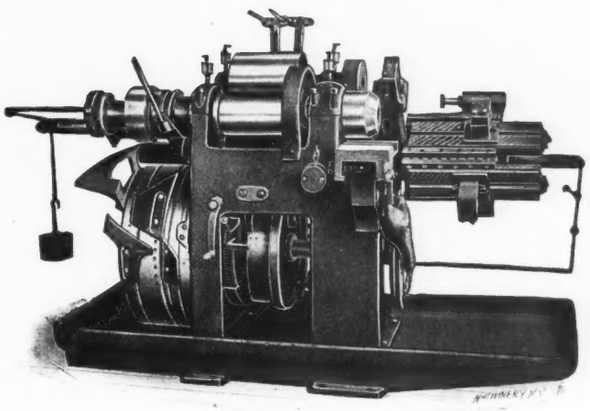


No workman possesses sufficient skill or quickness of eye and movement to operate an engine lathe on thread cutting up to the limit of its cutting speed. When, however, the necessary movements are performed automatically, those speeds can be realized.

That is exactly what the Automatic Threading Lathe accomplishes—cuts internal or external threads automatically, more accurately and more rapidly than the slow and expensive older methods. In operating the Automatic, the workman has a large portion of his time free for other duties—can run several lathes, or other machines in conjunction with the lathes simultaneously.

Catalog and complete information for the asking.

THE AUTOMATIC MACHINE CO., BRIDGEPORT, CONN.



One Operation or Several?

If you had to walk a certain distance, we are sure you would choose the route which would necessitate the **least** number of steps.

Now, suppose two machines were brought before you—one will accomplish certain work in **one** operation, but the same work done on the other machine would require **two** or **three** operations. Other things being equal, which machine would you choose?

The "Gridley" Automatic is the "short route" machine for modern shops because it permits using tools tandem, an arrangement which often allows you to accomplish **two** or **three** times more work in a given time than would be possible with other machines.

Other reasons, too—for instance: "Gridley" tools do not overhang, are held close to the work, so heavier cuts and coarser feeds are possible, and, as there is ample room on the "Gridley" Automatic to attach "special tools," it will handle work fully **twice the length** that other machines will.

Why not send for our latest bulletins?

Windsor Machine Co., Windsor, Vermont

Manning, Maxwell & Moore, Inc., Sales Agents, New York, Philadelphia, Pittsburg, Cleveland, Chicago, Buffalo, Detroit, Indianapolis, San Francisco, Milwaukee and St. Louis. M. Koyemann, Charlottenstrasse, 112 Dusseldorf, Germany; Italy, Holland, Belgium, Switzerland and Austria-Hungary. Craven Bros., Ltd., Vauxhall Works, Manchester, England, Sole Makers for Great Britain and the Colonies and South America. Office for France, 68 Avenue de la Grande-Armee, Paris, J. Ryan, Manager.

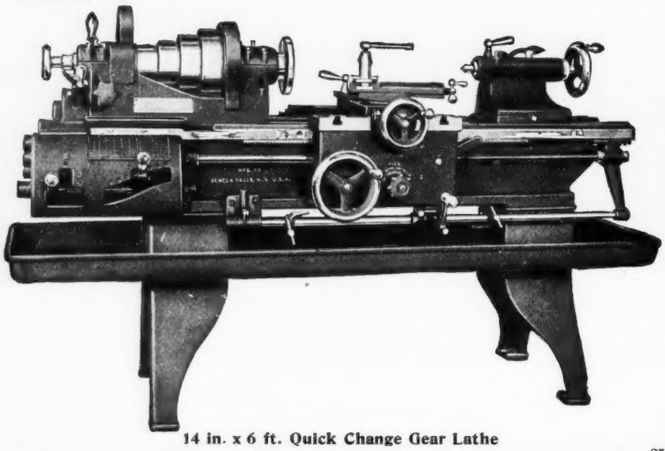
"SENECA FALLS" 14- AND 16-INCH SCREW CUTTING ENGINE LATHES have an entirely new micrometer cross-feed stop

One of the exclusive features of our new 14″ and 16″ quick change gear Engine Lathes is an original micrometer cross feed stop which gives a positive hand control for cuts of any depth.

The adjustment has graduations reading .00025″, and these are spaced 1/8″ apart, so that minute adjustments are easily made.

This stop saves time; it eliminates guessing at the depth or making several trial cuts to obtain the correct one; it saves stopping the lathe to caliper work, and it assures uniformity in making duplicate parts.

Doesn't this feature appeal to you? Let us send ALL the details.



14 in. x 6 ft. Quick Change Gear Lathe

250

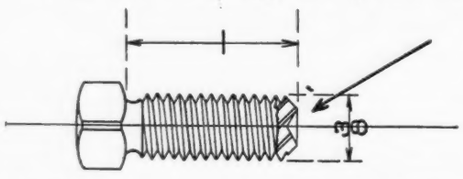
THE SENECA FALLS MFG. COMPANY

330 Water St., SENECA FALLS, N. Y.

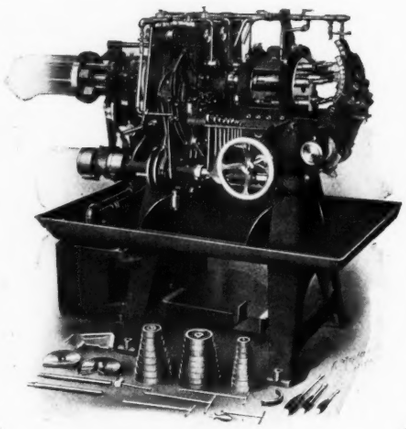
"The Davenport System"

Any machine can cut a good thread on a set screw, if the dies work well, but all cannot make a good point because on all other machines the tools can only finish the point when the roll is on the top of the cam at the end of the turning cuts, etc.

With the special Cam and Tool Slide for each cut, which is **"the Davenport System,"** the tools for finishing the point can be cutting the whole time the other tools are doing their work, thus making perfect points.



Is eight a minute a good product?



Davenport Multiple Spindle Automatic Screw Machine

DAVENPORT MACHINE TOOL CO.

NEW BEDFORD, MASS.

AGENTS: Motch & Merryweather Machinery Co., Cleveland, Cincinnati, Detroit and Pittsburg. Marshall, Huschart & Co., Chicago and Milwaukee. Chas. Churchil & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. F. G. Kretschmer & Co., Frankfurt, Germany, and Wien IX/2 Michelbeurnstrasse 1A. American Machinery Import Office, Zurich, Switzerland.

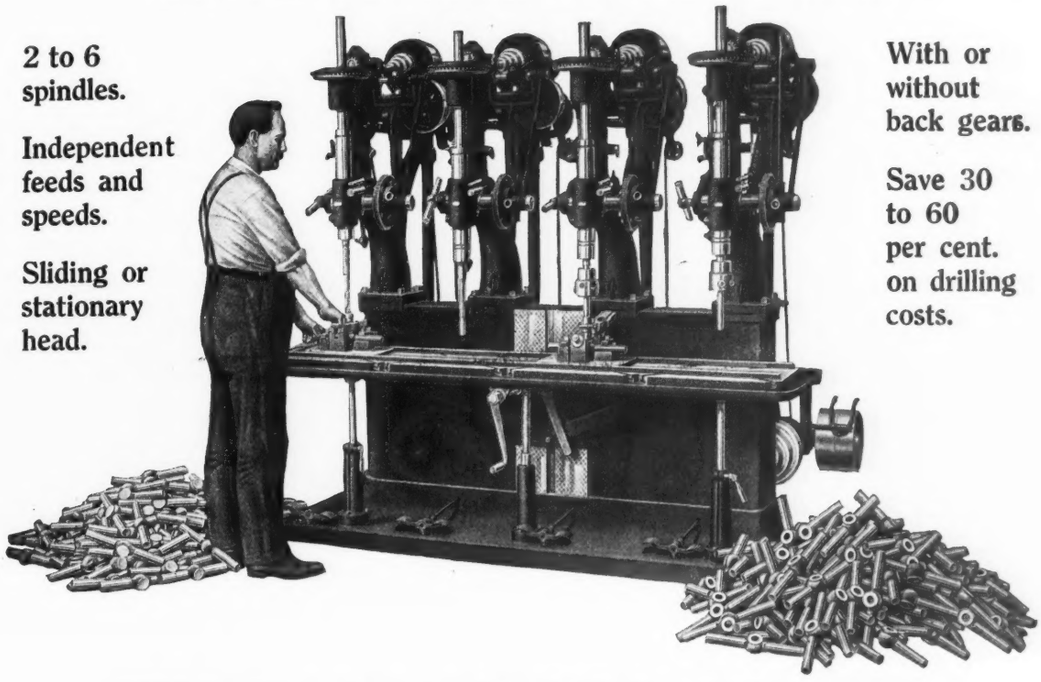
Rockford Gang Drills

RAPID—CONVENIENT—ECONOMICAL

2 to 6 spindles.

Independent feeds and speeds.

Sliding or stationary head.



With or without back gears.

Save 30 to 60 per cent. on drilling costs.

TIME AND MONEY SAVERS

New Patented Geared Tapper

is the simplest device imaginable. Easily controlled by one lever which throws the tap into forward speed or gives an instantaneous 2 to 1 reverse.

The new Tapper is part of the machine to which it is applied, not an attachment; is well designed, very strong and has few parts to wear or get out of order.

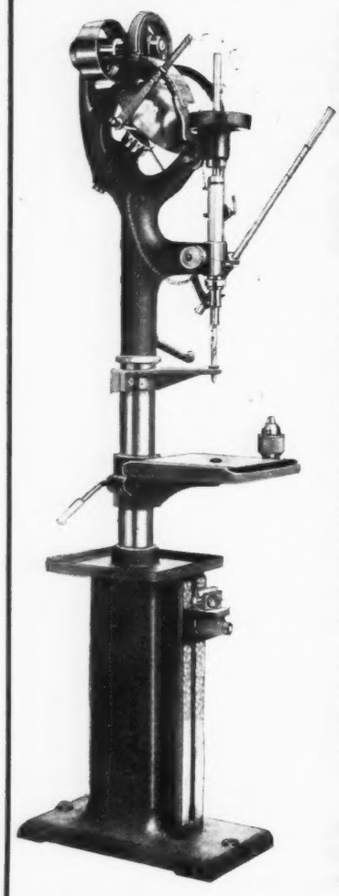
We are always glad to correspond with manufacturing concerns which want simple, powerful, accurate machines to help reduce production costs, with a reasonable outlay of capital.

WRITE FOR CATALOGUE

Rockford Drilling Machine Company

ROCKFORD, ILLINOIS, U. S. A.

Edgar Bloxham, Agent for France, Italy and Belgium; Thomas McPherson & Son, Melbourne; Alfred H. Schutte, Agent for Western Germany, Switzerland, Spain and Portugal; R. S. Stokvis & Zonen, Ltd., Rotterdam, Agents for Holland and the Dutch Colonies.



If you haven't decided on that tool-room drilling machine, don't give the order until you have looked into the merits of the

Albany 12-in. High Speed Drill Press

This machine gets right down to fast, accurate drilling as soon as you start it. Five perfectly adjusted ball bearings insure easy running. Ten changes of speed are instantly available and an index table shows the exact speed necessary to run any drill in different metals, and secure greatest efficiency. To save the bother of figuring and calculating, the "Albany" has a micrometer depth gauge that is arranged to show at a glance when you have drilled each hole to a proper depth.

We built this machine for **our own use** but it proved so **good**, we are now marketing it regularly and guaranteeing it to the limit. Covers every drilling requirement up to ½" holes.

Write us about it.

Albany Hardware Specialty Mfg. Co.
Albany, Wis., U. S. A.

No Tool Room is Complete
Without a
Van Norman "Duplex" Miller

Great Range

Rapid Changes of Operations

Cuts Time 25% to 50% on Many Tool Room Jobs.

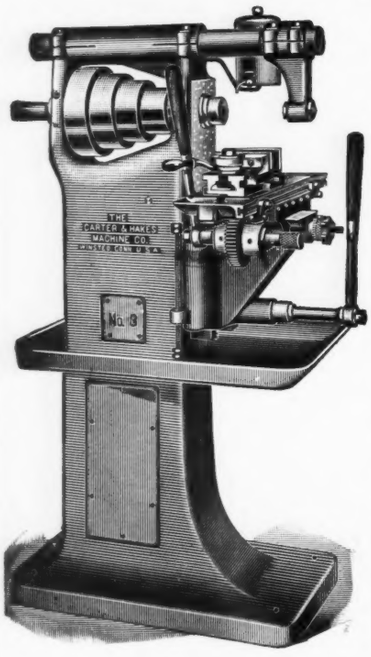
No. ½
"Duplex"

showing cutter head set to operate at an angle.

Shipping weight about 1400 lbs.

Waltham Watch Tool Co., SPRINGFIELD, MASS., U. S. A.

It Pays
To buy a good machine—one that is carefully designed, substantial, and well made.



The New Model Hand Miller,

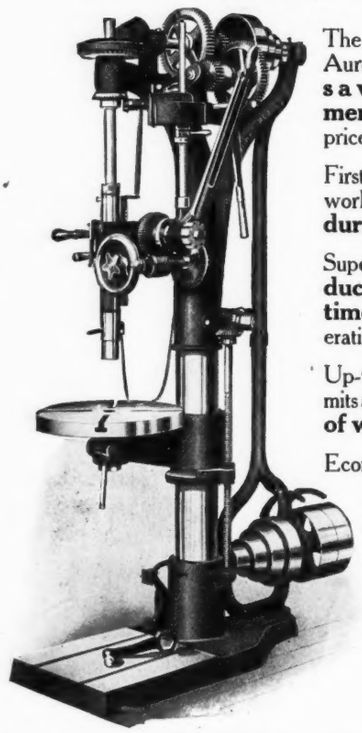
shown in the engraving, has all these qualities, and, if you have use for a machine of this type, it will be to your advantage to find out all about it.

Furnished with either power feed or vertical attachment, or with both when desired.

Circular sent on request

CARTER & HAKES CO.
Sterling Place **WINSTED, CONN.**

Economy and Aurora Drills Are Working Mates



The economy of the Aurora begins with the **saving** on **investment** its very moderate price insures.

First class material and workmanship guarantee **durability.**

Superior equipment **reduces labor cost** and **time** required for operations.

Up-to-date design permits an **unusual range of work** to be handled.

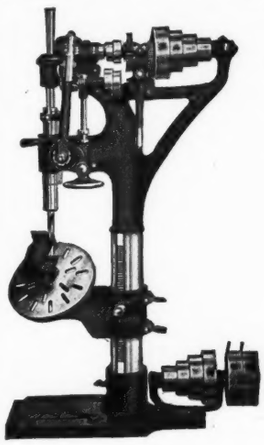
Economy and efficiency all through.

Sizes 14" to 44". Belt or motor drive. Tapping attachment if desired.

Aurora Tool Works, Aurora, Ind.

GET A "MODERN" 21-INCH DRILL WITH TILTING TABLE

The tilting table is a great time saver where work such as cylinder castings, etc., must be drilled at various angles. The adjustment is readily made from the operator's seat, and changes in the angle, up to 90°, quickly secured.

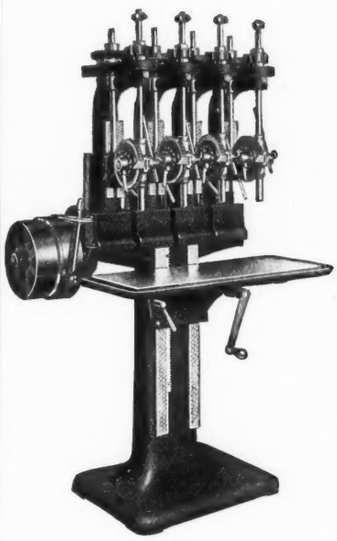


"Modern" drills are of extra heavy construction, strong and rigid, and their "square-spindle through the crown gear" design practically eliminates friction.

Send for specifications and prices.

FRONTIER IRON WORKS
BUFFALO, N. Y.

How About Drilling ¾" Holes 1" Deep in 18 Seconds?



You can do it with Taylor & Fenn Drilling Machines, and can drill ½-in. holes 1-in. deep in cast iron in 8 seconds. Their high speed makes them profitable, and many manufacturers find them indispensable for heavy drilling on both steel and cast iron.

And, when you stop to consider that the majority of holes drilled on all ordinary work are under ¾-in. in size, you will realize what an advantage it is to use machines like these which are specially adapted for drilling **small holes**, because they have the proper speeds for these holes.

We make many types. Send for catalogue.

The Taylor & Fenn Company
HARTFORD, CONN.

EUROPEAN AGENTS:—E. Sonnenthal, Jr., Berlin, Cologne and Vienna. R. S. Stokvis & Zonen, Ltd., Rotterdam and Brussels. Alfred H. Schutte, Paris, Milan and Barcelona. Schuchardt & Schutte, Stockholm, Copenhagen and St. Petersburg.

For Lighter Drilling

WE RECOMMEND

Our 14" Standard Drill

which can be furnished with square or round table—with or without power feed and tapping attachment.

Also

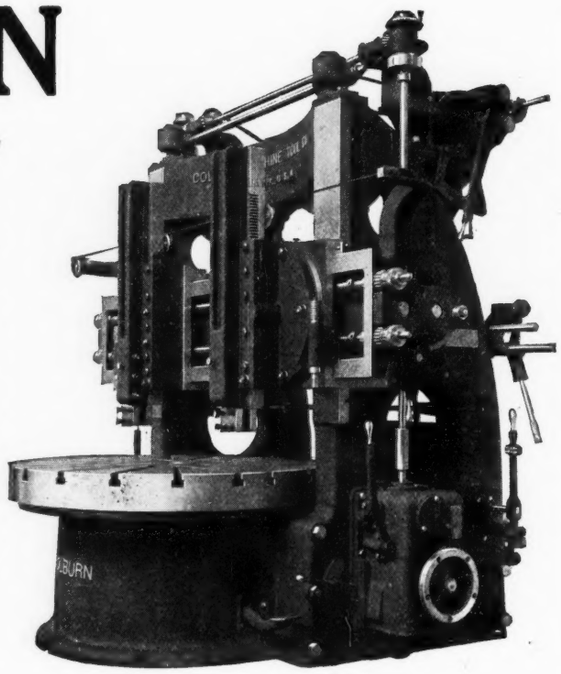
Our No. 1 Friction Drill

that is still very popular with the trade, after being in the market for fifteen years.

Send for catalogues of our full line.

Mechanics Machine Co.
19th Avenue ROCKFORD, ILL.

COLBURN
BORING MILLS



In Colburn Boring Mills neither time nor expense is spared in making them the best mills that it is possible to produce.

They are massive, yet quick acting. Powerful and staunch, yet so well designed and accurately built, that they respond instantly to the will of the operator. They are capable of turning out a big output of rough, heavy work, or can be depended upon in doing the closest and most accurate job.

There is no wasted time in handling Colburn mills. Everything is arranged to minimize both time and effort on the part of the operator.

Write for particulars concerning any size.

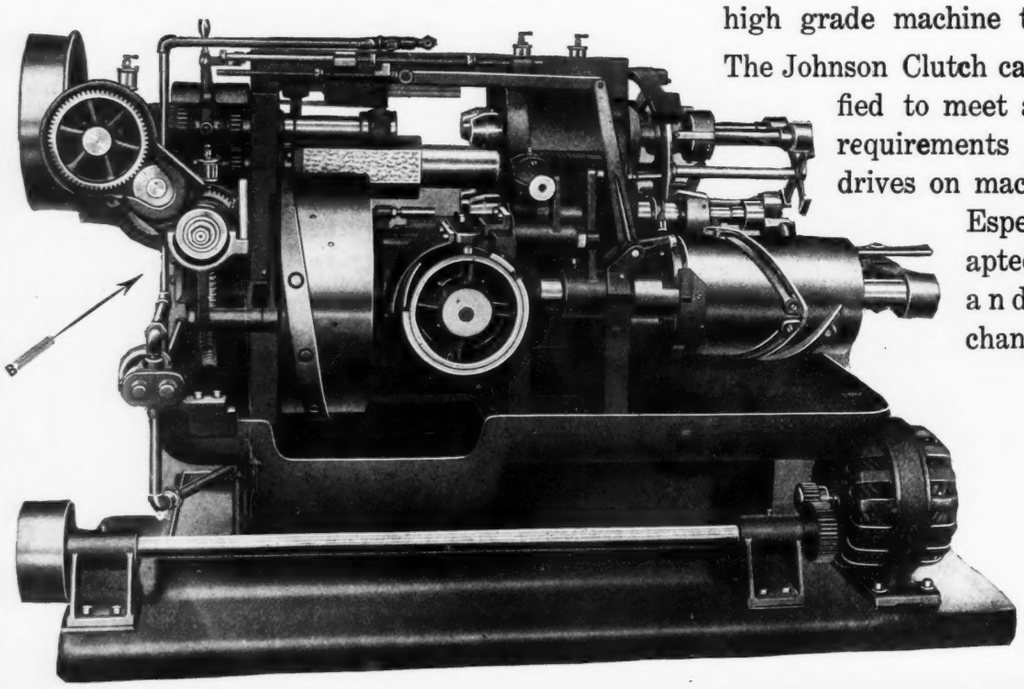
We build mills from 30″ to 72″ swing.

COLBURN MACHINE TOOL COMPANY
FRANKLIN, PA., U. S. A.

FOREIGN AGENTS: Schuchardt & Schutte, Berlin, London, Vienna, St. Petersburg, Stockholm, Prague, Tokio.

THE JOHNSON FRICTION CLUTCH

as used on the "Gridley Automatic Screw Machine" is another instance of how this small compact clutch is used by machine tool builders as a part of some of the best high grade machine tools built.



The Johnson Clutch can be modified to meet almost any requirements for light drives on machine tools. Especially adapted for feed and speed changes.

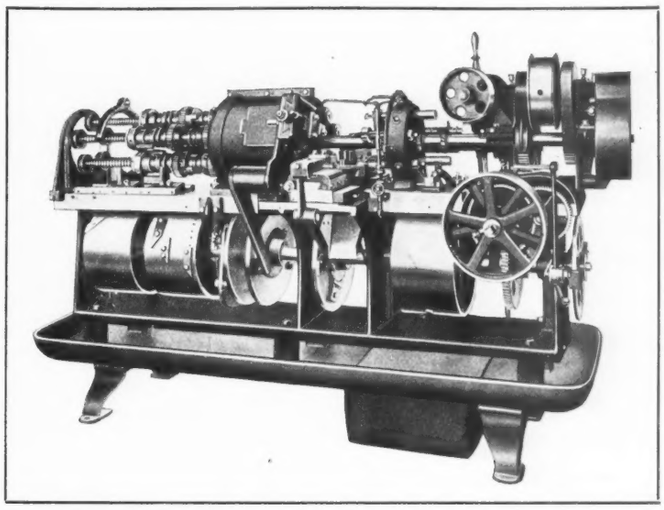
Regular Clutch with Pulley, incorporated at "B"

Send for Catalogue "A."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

THE "UNIVERSAL" FIVE SPINDLE Automatic Screw Machine

Means Economy in Screw Work.



Typical brass piece—embracing eleven operations—made in one operation on the "UNIVERSAL."

Advantages of the Five Spindle Type of Machine

are the employment of more tools, with consequent greater number of operations possible, the frequent elimination of need for second operations, and the increase in output from each machine.

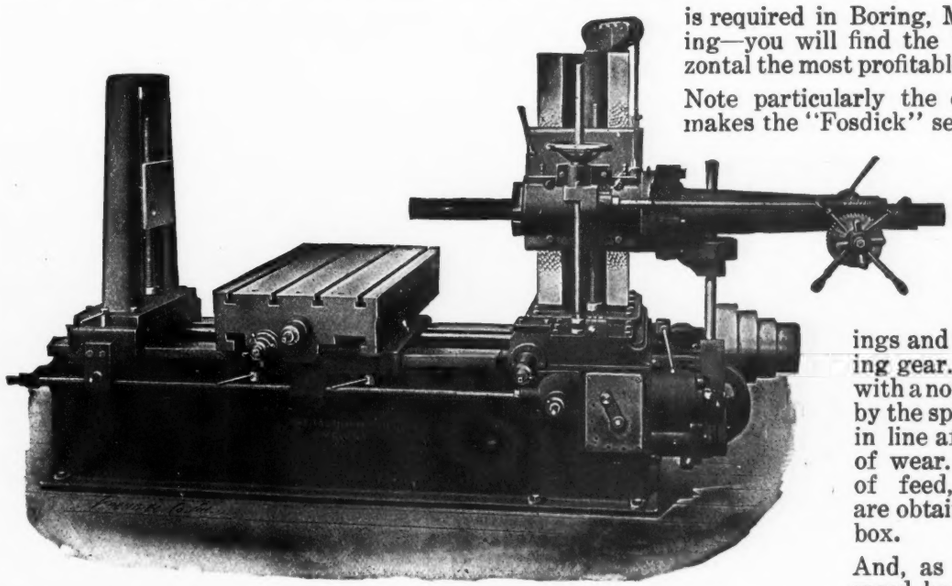
Ask for booklets and samples of work.

THE UNIVERSAL MACHINE SCREW CO.

HARTFORD, CONN., U. S. A.

DOMESTIC AGENTS: Prentiss Tool & Supply Co., New York, Boston, Buffalo. Brown & Zortman Machinery Co., Pittsburgh, Pa. Niles-Bement-Pond Co., Chicago, Ill., and Detroit. W. E. Shipley Co., Philadelphia.

For the Tool Room or Wherever Great Accuracy



is required in Boring, Milling and Drilling—you will find the "Fosdick" Horizontal the most profitable machine to use.

Note particularly the deep bed which makes the "Fosdick" self-contained and insures perfect alignment of the table with the spindle and outer support at all times. The sleeve runs in bronze bearings and carries the driving gear. It is equipped with a novel device whereby the spindle can be held in line after any amount of wear. Eight changes of feed, all reversible, are obtained through one box.

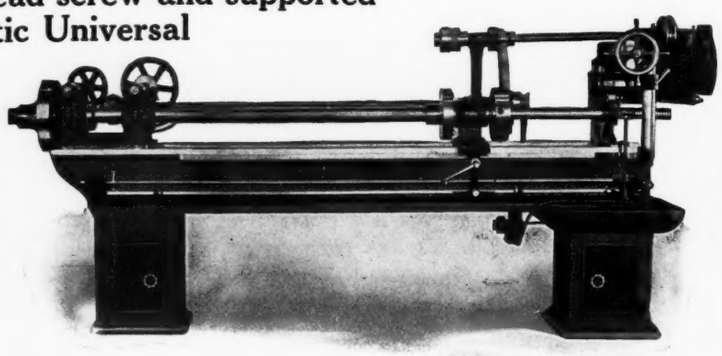
And, as both cone and speed box drives can be *started* and stopped from the front of the machine, it is a great "step-saver" for the operator.

The New "Fosdick" Catalog gives full details. Shall we send you a copy?

THE FOSDICK MACHINE TOOL CO., Cincinnati, O., U.S.A.

DOMESTIC AGENTS: The Fairbanks Co., Boston, Hartford, New York City, Philadelphia and Baltimore. The Baird Machinery Co., Pittsburg, Pa. The W. M. Pattison Supply Co., Cleveland, Ohio. The C. C. Wormer Machinery Co., Detroit, Mich. The E. A. Kinsey Co., Cincinnati, Ohio and Indianapolis, Indiana. The H. A. Stocker Machinery Co., Chicago, Ill. J. W. Wright & Co., St. Louis, Mo. Eccles & Smith Co., San Francisco, Cal. The Smith-Booth-Usher Co., Los Angeles, Cal. The A. R. Williams Machinery Co., Ltd., Toronto, Canada.

All work is in line with the lead screw and supported under the cutter on Automatic Universal Thread Milling Machines.



Side strains, bending and buckling are all avoided by the new principle of design which overcomes friction and power-waste.

Blanks are gripped from outside by chuck jaws at one end of the large stiff lead screw.

Simplicity is the keynote, maximum accuracy and output, the result.

Send for details of the machines or estimates on first quality screw work.

"Visitors always welcome at our works"

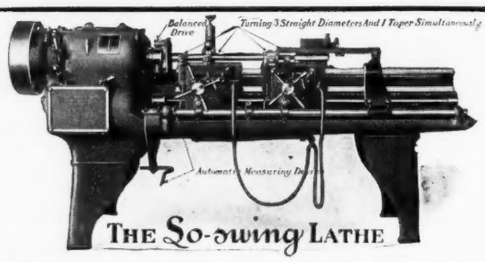
Milled Screw & Machine Co.

SAYRE, PA., U. S. A.

Automatic 5-Spindle Screw Machines
and
Screw Machine Product

The Peerless Automatic Machine Company

Cleveland, Ohio



THE So-swing LATHE

A machine of greater power than the average 24″ Engine Lathe—using 2 to 6 tools at one time on anything up to 3½″ diameter. Turns a portion of the shaft taper at the same time, if desired.

FITCHBURG MACHINE WORKS
Fitchburg, Mass.

ROBBINS ENGINE LATHES

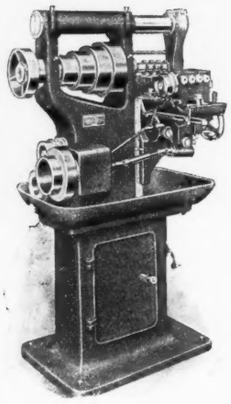
Our new design Engine Lathes have all the improvements necessary for practical and economical use. We invite comparison with any standard make for ease of operation, workmanship, strength and efficiency.

12-14 and 15 inch sizes.

Send for circulars.

THE ROBBINS MACHINE CO.

149 Lagrange Street Worcester, Mass., U. S. A.



Two Taps

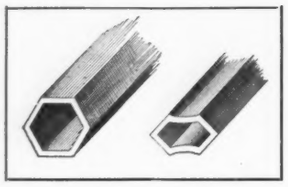
½″ size, is the fluting capacity

Per Minute

of this machine.

Bickford Machine Co.,
Greenfield, Mass., U. S. A.

AN OLIVER QUALITY ROLLING MILL MAY SOLVE SOME OF YOUR MANUFACTURING PROBLEMS

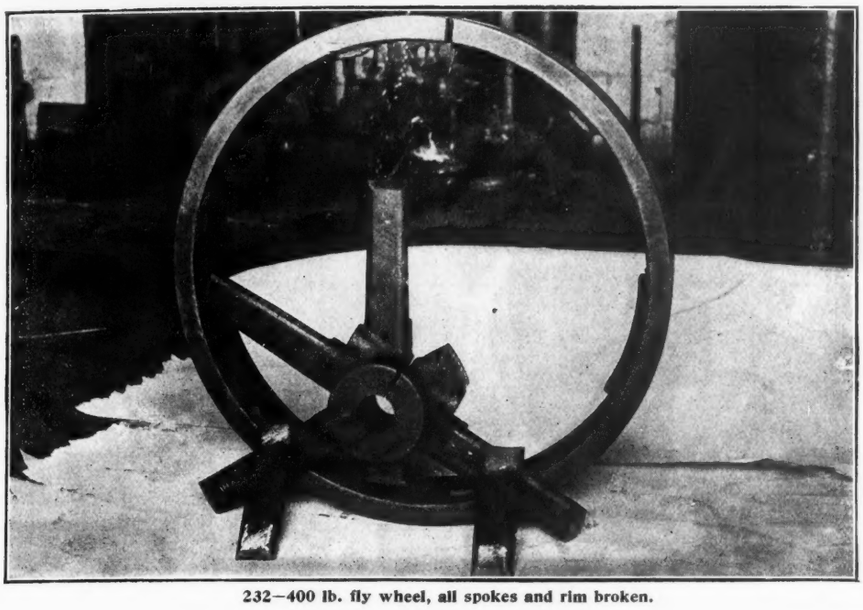


These two illustrations show cross sections of hexagon tubing, as it was originally, and the special shape produced by rolling the hexagon through one of our Rolling Mills, with Special Formed Rolls.

We shall be glad to try our machines on *your* work, and to offer the benefit of our twenty-five years' experience.

The W. W. Oliver Mfg. Co., 1500 Niagara St., Buffalo, N.Y.

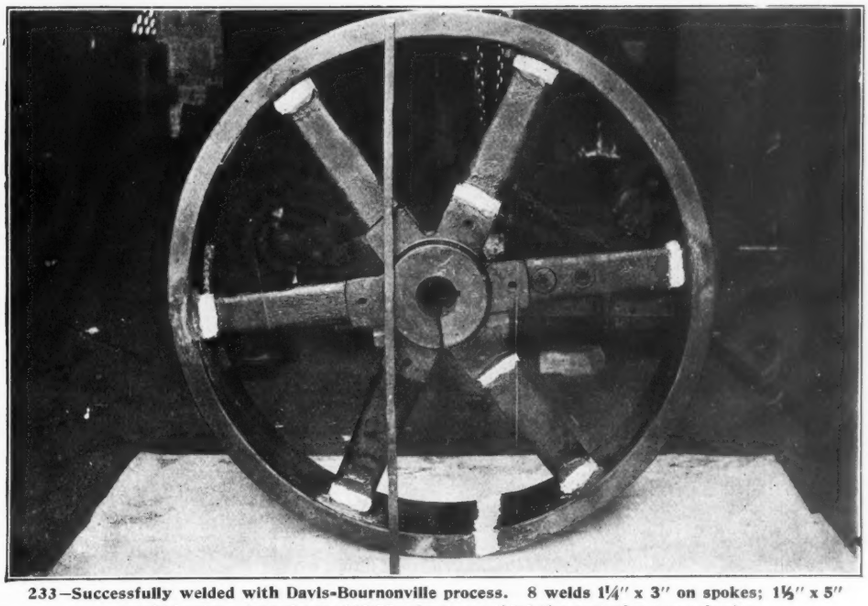
WELDED WITH OXY-ACETYLENE



232—400 lb. fly wheel, all spokes and rim broken.

Repairs like this are made with the Davis-Bournonville equipment for oxy-acetylene welding and cutting—**the efficient, independent pressure, positive mixture, neutral flame process** which gives results.

Profitably installed in the largest metal-working industries, and in small repair shops. Full information about process and equipment, and numerous illustrations on request. Sample copy "Autogenous Welding" mailed on request.



233—Successfully welded with Davis-Bournonville process. 8 welds 1¼" x 3" on spokes; 1½" x 5" weld in rim. Actual cost $13.55, about one third the cost of a new wheel.

DAVIS-BOURNONVILLE COMPANY, 97 West Street, NEW YORK 515 Laflin Street, CHICAGO

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Simon & DeVine, 3932 Olive St., St. Louis, Mo.
Montana—Mountaineer Welding Co., 408 S. Main Street, Butte, Mont.
New York—Oxy-Acetylene Appliance Co., Singer Bldg., 149 Broadway, New York.
Ohio—Ohio Welding & Manufacturing Co.,
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937-945 West St., N. W., Cleveland, Ohio.
Pennsylvania—Oxy-Acetylene Appliance Co., 708 Farmers' Bank Building, Pittsburg, Pa.
Washington—Seattle Welding Company, 1532 First Ave., So., Seattle, Wash.
Manila, P. I.—Philippine Acetylene Co, P. O. Box 782, Manila, P. I.

SLOCOMB A BUY WORD FOR MICROMETERS

A combination of essentials, accuracy, durability, convenience, adjustments and attractiveness in price makes Slocomb's tools best for steady use.

The micrometers are not fancy tools with a corresponding price, but are tools attractive in price and made for continued hard use. Investigate these for yourself before ordering and you will find our statements borne out.

CENTER DRILLS

Accurate and made for hard work. If you use them, test these. We will submit samples if you will tell us how many you use. Get some and try them. *Catalog 12-M and Measuring Book free on request.*

J. T. SLOCOMB CO., Providence, R. I.

Chas. Churchill & Co., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Ludw. Loewe & Co., Berlin.

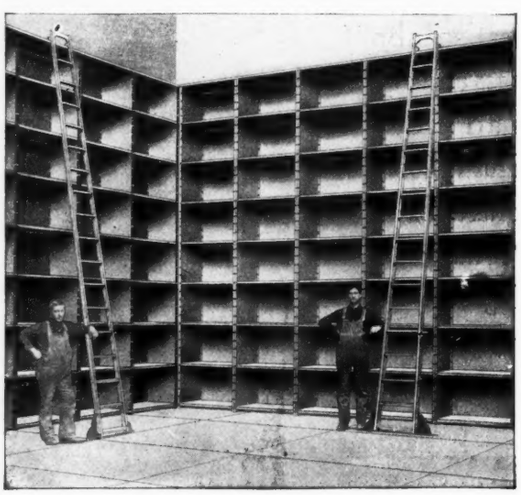
Gerstner Tool Cases

Are designed to carry a full kit of tools, to keep them orderly and in first-class condition. There is a place for every tool in the different sized, shellac finished and felt lined drawers where they are safe and instantly accessible. Correctly proportioned, well made and handsomely finished, Gerstner Cases are the pride of particular men everywhere. They make your work pleasant, they pay for themselves in saving time and tools, and every up-to-date mechanic should have one. Do you want us to send a booklet describing and pricing the different styles?

H. Gerstner & Sons. DAYTON, OHIO

815-821 Germantown St. Dayton, Ohio

Manufacturers of Mechanics' High Grade Tool Cases



THE VALUE OF TIME

was not appreciated until the 19th Century, the 20th Century discovered the value of space. Five steps saved in each hundred, increases efficiency five per cent. Compact storage saves time, space and dollars.

Terrell's Steel Equipment

includes Racks, Shelving, Lockers, Bins—everything in steel for factory or shop. Reduces the fire risk, keeps stock in order and puts your plant on an up-to-date basis.

Write for booklet and prices.

Terrell's Equipment Company

NORTH GRAND RAPIDS, MICH.

Be Proud of Your Work

When it's finished, it must fit, if you've proved your measurements with Starrett Tools.

Starrett Tools are made accurate—they last a life-time and are still accurate.

When you buy them, you buy a faith in yourself and the accuracy of your work which lets you do more work and better work.

Calipers and Dividers
Clamps, Drill Blocks
Gages—Wire, Thickness, Screw Pitch—all sorts.
Hack Saws and Frames
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Pliers, all sorts of Rules and Steel Tapes
Speed Indicators, Squares

Look through your kit. Don't you need some tool to make your work better? Send for Catalog 19D—274 pages, full of illustrations and useful information. Send today—we will tell you your nearest dealer.

THE L. S. STARRETT COMPANY

ATHOL, MASS., U. S. A.

NEW YORK, 150 Chambers St. CHICAGO, 17 N. Jefferson St. LONDON, 36-37 Upper Thames St., E. C.

Ye Olde Tool Shoppe

BETTER THAN EVER, but not at the old stand, as we now have our own new modern building, where we continue handling such well-known lines as

Bay State Taps and Dies,
Brown & Sharpe's Tools and Cutters,
Morse Twist Drills and Reamers,
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PETER A. FRASSE & CO., 417-421 CANAL ST., NEW YORK
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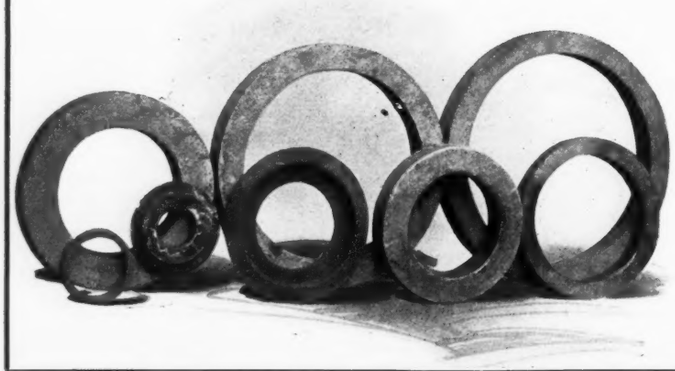
"HAWK" BRAND TOOL STEEL

Has withstood the most rigid tests for the past 30 years, thus proving its superiority in strength, durability and workability.

Steel of Every Description

HAWKRIDGE BROTHERS COMPANY, 303 CONGRESS ST., BOSTON, MASS.



FORGINGS

Weldless Steel Rings and other machinery forgings from any grade of steel—superior to steel castings—quicker deliveries, and often less expensive.

Let us estimate on your work.

The Machinery Forging Co.
Cleveland, Ohio

HIGH SPEED
CARBON
STEEL TREATMENT

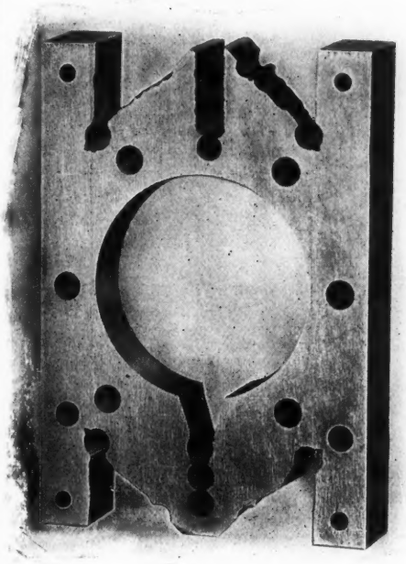
ANNEALING - HARDENING - CASE HARDENING

Hardening and Tempering Taps, Dies, Reamers, Milling Cutters, Special Tools. Annealing Bar Steel, Forgings, Iron Castings.

20 YEARS EXPERIENCE

New England Annealing & Tool Company
South Boston, Massachusetts

WE SPECIALIZE ON STEEL FOR DIE WORK



Besides being absolutely sure there will be **no change in hardening** if you use Cammell Laird & Co.'s steel for your dies, you can count on a finer and more durable edge than with other steels. The test die, shown herewith, did not vary as much as 1-10,000" in any dimension after it was hardened, and this piece presents unusual difficulties. Write us your requirements. We carry full stock on hand and shall be glad to give you the benefit of our experience in making and using high speed steels.

Cammell Laird & Co., Ltd., (Sheffield)
25 Cliff Street, NEW YORK CITY

Cold Drawn Steel Shafting

Screw Stock, Flats, Squares,
Hexagons, Special Shapes

Finished Machine Keys
Machine Rack
Finished Crank Shafts
Complete Connecting Rods

All work finished to the highest degree of accuracy.

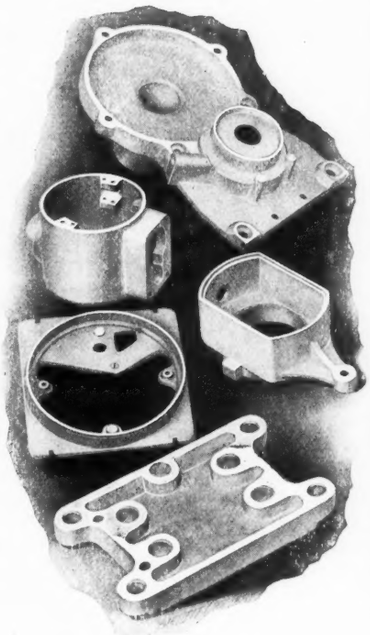
STANDARD GAUGE STEEL CO.
BEAVER FALLS, PA.

DIE CASTINGS

and die casting possibilities ought to be known to every up-to-date designer and manufacturer.

Saving of time and trouble in assembling of intricate and accurate parts, as well as saving in the original cost of production, are of vital interest to every wide-awake buyer.

We cast complicated parts in a finished state, ready for assembling.



Send for our catalogue "M," and be posted on up-to-date methods.

Doehler Die-Casting Company
Court and Ninth Streets, BROOKLYN, N. Y.

Spiral Gears
Our Specialty

We also have excellent facilities for turning out spur, worm and bevel gears of guaranteed accuracy at moderate prices.

We are in a position to make prompt deliveries, and we solicit an opportunity to estimate on your requirements.

Carpenter-Tew Gear Company
SUCCESSORS TO
Carpenter-Kerlin Gear and Machine Co.
Bush Terminal Buildings BROOKLYN, N. Y.

FAWCUS MACHINE CO.
PITTSBURG, PA.
Cut Gears to 24 feet dia. and Heavy Machinery Designed and Furnished for All Purposes.
WORKS FORD CITY & PITTSBURG, PA.
MAIN OFFICE, PITTSBURG. N.Y. OFFICE 50 CHURCH ST.

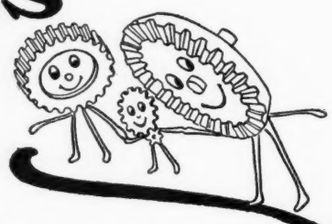
ELECTROTYPERS

All Kinds of Plates for Printing
THE LOVEJOY CO.,
(Established 1853)
444-446 Pearl St., New York

SPECIAL GEARS

ON SHORT NOTICE? SURE!

Any Kind, Diameter, Pitch or Material



Make them up if need be—we are specialists on rush work—but the chances are you can find the very gear you need from our very large line of stock gears. Don't lose money on a shut-down for broken or stripped gears while the "Gear Man" is on the wire. Send us a hurry call and we'll do the rest. *Catalogue at your service—Grant's "Treatise on Gears"—$1.00.*

PHILADELPHIA GEAR WORKS, INC.

1120 VINE STREET GEO. B. GRANT, PRES. PHILADELPHIA, PA.

MACHINERY

SILENT METAL GEARS

Noisy metal gears are the result of improper lay-out and careless cutting.

Properly designed, accurately cut gears are as "noiseless" as any gear can be.

Earle Gears are so carefully laid out and so accurately cut, that they are "noiseless" gears.

And, because noise in gears means wear, **Earle Silent Metal Gears are long-wearing gears.**

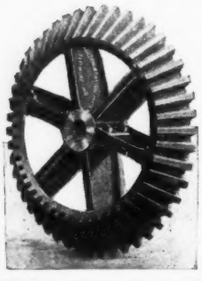
Earle Gear and Machine Co.

WAYNE JUNCTION,
PHILADELPHIA, PENNA.

POOLE GEARS

Machine Moulded or Cut

Spurs Bevel and Angle Gears



Mortise Internal and Worm Gears

Our facilities range from the smallest to a gear fifty feet in diameter

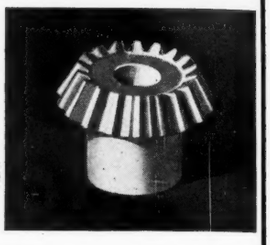
Builders of

HEAVY MACHINERY

Poole Engineering & Machine Company
BALTIMORE, MARYLAND

Franklin Die-Cast Gears

Stand for Progress



Bevel, Spur, Compound and Internal gearing are cast with equal ease and accuracy by the Franklin Process. All holes and teeth being cast at one operation, they approach the low price of the rough sand cast gear, while exceeding the accuracy of machine cut work.

Write for Booklet "C"

Franklin Manufacturing Company
203 South Geddes Street SYRACUSE, N. Y.

BEVEL GEARS Cut Theoretically Correct

Facilities for cutting Spur, Worm, Spiral and Internal Gear Wheels.

Bevel Gear Generators and Special Machines

THE BILGRAM MACHINE WORKS, 1231 SPRING GARDEN ST. PHILADELPHIA, PA.

CULLMAN SPROCKETS

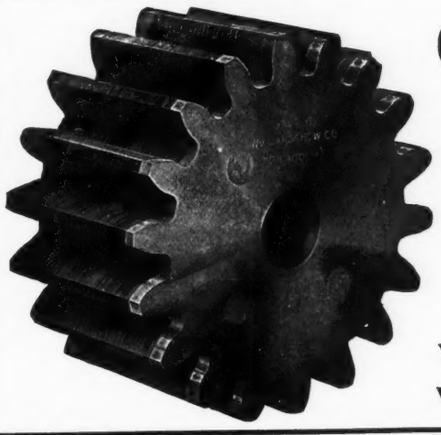
COMPLETE DRIVE FOR BLOCK & ROLLER CHAINS

BALDWIN DIAMOND & WHITNEY CHAINS ON HAND

IN STOCK OR TO ORDER

CATALOGUE FREE

CULLMAN WHEEL CO.
1019 GREENWOOD TERRACE – CHICAGO



Ganschow Quality Gears

Excellence of workmanship is the only safe basis for modern gear manufacturing.

Ganschow Gears and Rawhide Pinions withstand hard service, are strong, long-wearing, and noiseless running, because they are as perfect as modern methods can make them. Estimates promptly furnished.

WILLIAM GANSCHOW COMPANY

Washington Boulevard and Morgan St. CHICAGO, ILL., U. S. A.

Grant Gear Works, Inc.

GEO. B. GRANT

6 Portland St., BOSTON, MASS.

Gear Wheels and Gear Cutting

LIST STOCK GEARS

Gear blanks to be changed to your specifications.

"Treatise on Gears," by Grant. *Catalogue Free.*

BOSTON GEARS

Our ready made gears are used all over the United States. We have a liberal supply of all sizes in stock for immediate delivery. You should have a copy of our NEW CATALOG which gives the complete dimensions of all gears listed.

We will be glad to figure on your special requirements upon receipt of specifications.

BOSTON GEAR WORKS

NORFOLK DOWNS, MASSACHUSETTS

Gears Axles Transmissions

For

AUTOMOBILES

FROST GEAR & MACHINE CO.

JACKSON, MICH.

QUALITY

Gears

CUT GEARS OF ALL KINDS

Spur, Bevel, Spiral

Worms and Worm Wheels, Sprockets

New England Gear Works, 100 Purchase St. BOSTON, MASS.

The

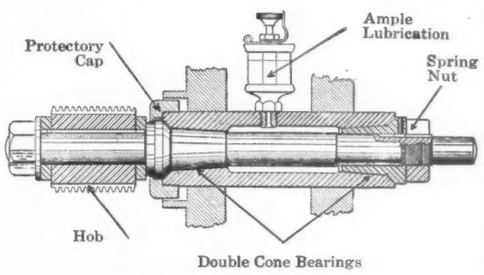
M-C GEAR HOBBER

is built right.

Consequently, the work it turns out is right. Note the hob spindle bearing construction on No. 3 machine, shown herewith.

Meisselbach-Catucci Manufacturing Co.

29 Congress St., Newark, N. J



HOB SPINDLE BEARING.

THE SCHWERDTLE STAMP CO.,
STENCILS-BURNING BRANDS
STEEL STAMPS & DIES
SEALS-MACH. PLATES-CHECKS
BRIDGEPORT, CONN.

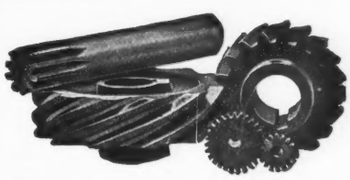
GEARS

We have special facilities for the production of gears of *quality*. Prices just right. Also builders of special machinery. Let us quote on your requirements.

NEWPORT GEAR & MACHINE WORKS

Second and Beach Ave.

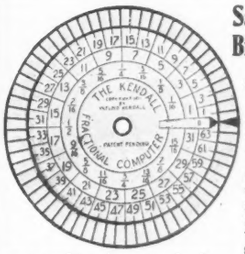
NEWPORT, - - KENTUCKY



Gears and Gear Cutting

WE GUARANTEE SATISFACTION

RODNEY DAVIS, Philadelphia

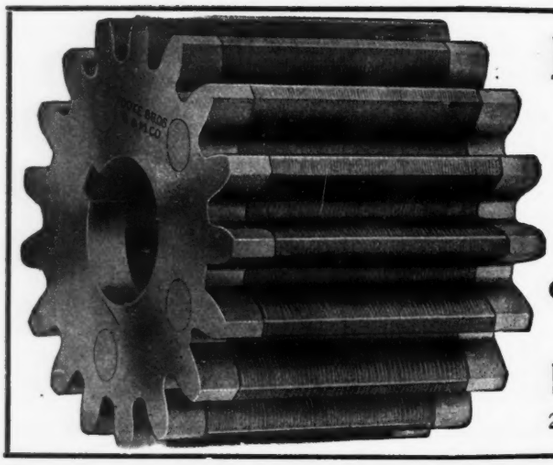


Save Time and BrainWork

Send today for the **Kendall Fractional Computer,** the handiest device for figuring fractions yet offered. Combines the advantages of speed and accuracy, and is a boon for draftsmen or others engaged in mathematical work.

25 cents each or 6 for $1.00

W. F. KENDALL, West Haverstraw, N. Y.



In an Era of Positive Drives

our Noiseless Rawhide Pinions are saving machine operators' nerves for the better purpose of speed production.

These silent drivers carry all the load of a metal pinion, endure longer and run easier when properly made—made as we make them.

Gear Specialists in Steel, Iron and Rawhide.

Send us your inquiries.

Foote Bros. Gear & Machine Co.

210-220 N. Carpenter Street, CHICAGO, ILL., U. S. A.

What Nuttall Gears Will Do

Operate at 20 to 40% saving of power—run smoothly and quietly in severe and continuous service—increase the efficiency of the machinery. These claims have been proven repeatedly by Nuttall Gear users all over the world. Accuracy, material, and wearing qualities guaranteed. Send in your specifications or blue prints for special trial proposition.

Nuttall—Pittsburg

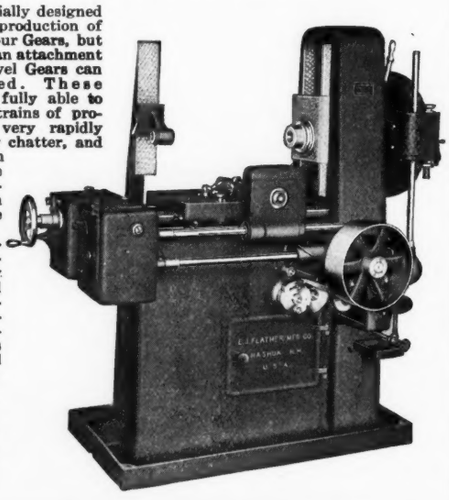
When in a hurry, wire us

FLATHER AUTOMATIC GEAR CUTTING MACHINES

Are equipped with an original and simple FEED CHANGE MECHANISM enabling the operator to obtain a variety of feeds WITHOUT CHANGE OF GEARS.

They are specially designed for the rapid production of accurate Spur Gears, but when desired, an attachment for cutting Bevel Gears can be furnished. These machines are fully able to stand all the strains of producing gears very rapidly without jar or chatter, and with smooth teeth of the greatest accuracy from the finest to the coarsest pitch. They are simple, easy to understand, easy to operate, and they have innumerable important, exclusive features that will appeal to you at once.

Let us fully inform you NOW—write for our descriptive circulars.



E. J. FLATHER MFG. COMPANY

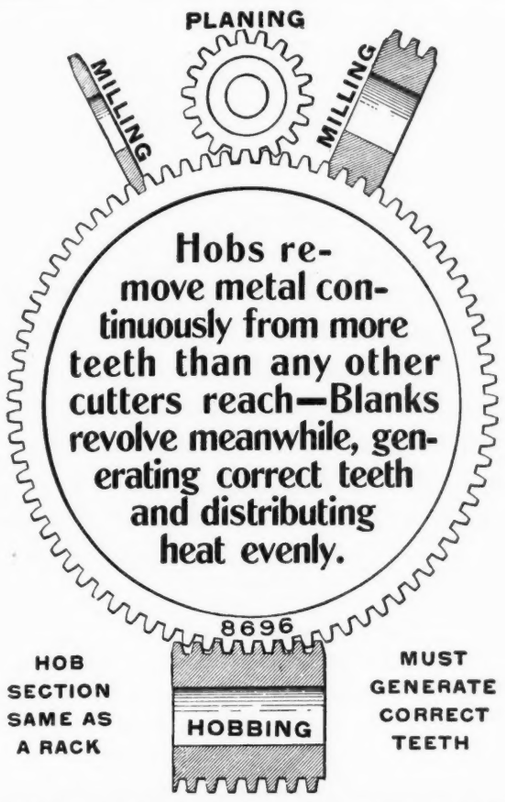
NASHUA, N. H., U. S. A.

Peerless Rawhide Pinion Blanks Are Seasoned Three Months

Made from dried native steer "sides," the rough pinion blanks are cemented together and dried in a seasoning room from two to three months, according to the size of the blank, then turned and finished. This is why Peerless Rawhide Pinions contain the greatest possible number of layers per inch face—and will never shrink when properly cared for.

The advantages of noiseless gear drives are well known. We'll be glad to send you our *Blue Book on Gearing* and try to show you the special reasons you need *Peerless* Rawhide Pinions.

The Horsburgh & Scott Company, Cleveland, Ohio, U.S.A.


PLANING
MILLING
MILLING
Hobs remove metal continuously from more teeth than any other cutters reach—Blanks revolve meanwhile, generating correct teeth and distributing heat evenly.
8696
HOB SECTION SAME AS A RACK
HOBBING
MUST GENERATE CORRECT TEETH

Write Us for Figures On Your Gears and Let Us Cut Sample Blanks To Show What High Class Work Our Machine Does.

Circular No. 802-M

Our Gear Diagram

shown herewith proves beyond dispute that gear hobbing must be more rapid than any other method.

The Farwell Gear Hobber

is even faster than other hobbers on account of superior rigidity, wide range of feeds and the fact that hobs of any diameter, number of threads or thread angle may be used when speed can be increased thereby.

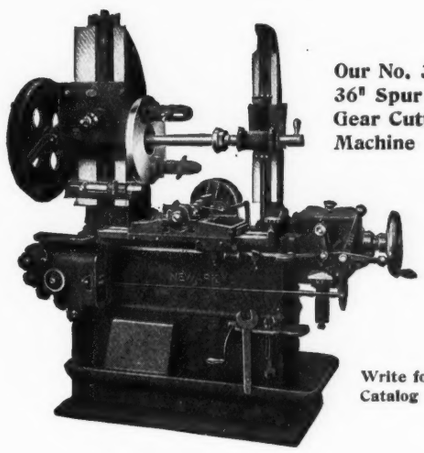
The special gauges used in setting up our machines save time as well as insure accuracy, and we have fewer gears to change in setting for number of teeth.

The Adams Company 839 Market Street Dubuque, Iowa.

NEWARK

MACHINES FOR

Smooth Running Gears



Our No. 3 36" Spur Gear Cutting Machine

Write for Catalog

NEWARK GEAR CUTTING MACHINE COMPANY

GEAR SPECIALISTS

66 Union St., NEWARK, N. J., U. S. A.

No Preliminaries!

The actual cutting of spur gear teeth begins when this machine is started, and is one progressive cutting operation until the job is finished.

Operators of ordinary experience can run the

Reynolds Gear Hobbing Machine

which is so simple that neither indexing or perplexing calculations are required to insure perfect work. It is almost a matter of "Put in the gear blank—this machine does all the rest."

We'd like to tell you about "Reynolds" simplicity, direct drive and hob of fixed thread angle—ask for circular.

Reynolds Machinery Company

MOLINE, ILLINOIS, U. S. A.

WE CUT ACCURATE METAL GEARS.

GEAR CUTTING is our specialty and this plant is second to none in facilities. No order is too large, too small or too difficult. Our decidedly modern equipment permits us to get out blanks and cut any kind of teeth at reasonable prices. Let us quote on your next requirements.

THE NEW PROCESS RAW HIDE CO.

SYRACUSE N.Y.

A. E. MICHEL, ADV. N.Y.

The Proper Way to Cut Worm Wheels

The new taper hob attachment for S & S Gear Hobbing Machines should be investigated at once.

It is the most important and far-reaching improvement in worm-wheel cutting made in many years and means a radical departure from all old methods and their disadvantages.

Worm wheels of high lead or multiple threads are cut with absolute accuracy and without any ridges on the tooth flanks. It will do the work better and quicker than any other machine on the market and permits the use of short tapered hobs, comparatively inexpensive, as their length does not depend on the diameter of the wheels to be cut. For odd jobs, a fly cutter with one tooth can be used.

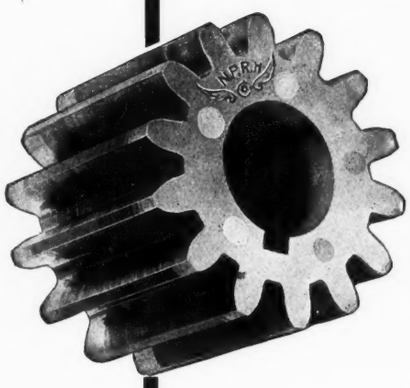
S & S machines are always in the lead and have been so for 40 years. Learn about their exclusive features for spur and spiral gear-cutting.

Schuchardt & Schutte

Cedar and West Sts., NEW YORK

"Only reliable goods can be continuously advertised"

—*American Machinist.*



New Process Noiseless Gears and Pinions have been advertised more in the last twenty years and used in greater numbers than all other makes of silent gearing combined.

Their reputation and recognition as the world's standard is based upon an absolute uniformity of quality and finish obtained only by special scientific curing of the rawhide in large lots and machining exclusively on special tools and by men whose efforts are concentrated **on this one line.**

The ability of New Process Gears and Pinions to withstand severe service is evidenced by their use as a standard part upon hundreds of the best makes of American machines. Their supremacy is further proven by use in United States Government Service, in power plants of leading commercial organizations and in every imaginable place where geared motor drive is practical.

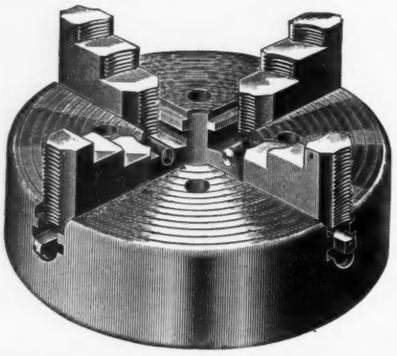
If you have any doubts as to the performance of New Process Pinions, if you want advice on some particular installation, or if you want reference to New Process Pinions in your neighborhood, write to us. Our engineering service is free to prospective customers. Ask for booklet.

34

The New Process Raw Hide Co.

N.P.R.H. REGISTERED

OFFICE & WORKS SYRACUSE, N.Y.



Cut represents sizes of IMPROVED INDEPENDENT CHUCKS below 16" in size

LONG EXPERIENCE

enables us to anticipate modern mechanical requirements, and to have in readiness for prompt shipment a line of

CHUCKS

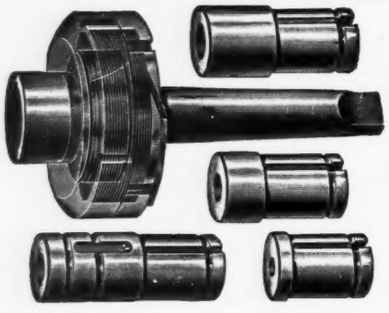
To meet all such demands

THE HORTON CHUCK

made by this Company continues to be the favorite with the younger generation of mechanics, as well as the older, and maintains its supremacy as of old. We make all sizes of *COMBINATIONS, UNIVERSALS, INDEPENDENTS, DRILL-CHUCKS, etc. Send for catalogue.*

THE E. HORTON & SON CO. WINDSOR LOCKS, CONN., U. S. A.

Or Chas. Churchill & Co., Ltd., London, Birmingham, Manchester and Glasgow. Schuchardt & Schutte, Berlin, Cologne, Vienna, Stockholm, St. Petersburg and New York. Fenwick Freres & Co., Paris, France. Van Rietschoten & Houwens, Rotterdam, Holland. G. Hartmann, Kristiania, Norway.



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Safety Drill & Tap Holder

is the only attachment for the purpose that gives universal satisfaction, and is

UNEQUALED in Efficiency, Convenience, Rapidity, Accuracy and Simplicity.

Nothing to break or get out of order. Made in 4 sizes, covering from 0 to 2½ in. diameter.

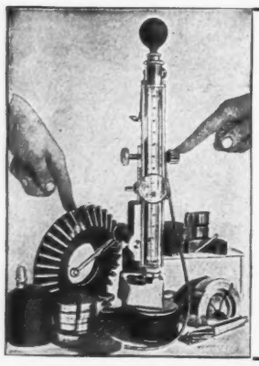
The Beaman & Smith Co., Providence, R. I.

1874 TRUMP DRILL CHUCK 1910

Self centering and well made. Holds either straight or taper shank drills and bits. Readily fitted to any machine. 3 sizes, capacities from 0 to ⅛", ¼" and ⅜".

Circular.

TRUMP BROS. MACHINE COMPANY, Wilmington, Delaware



Hardness Testing

You are now obliged to do, to keep abreast with the times.

THE SCLEROSCOPE

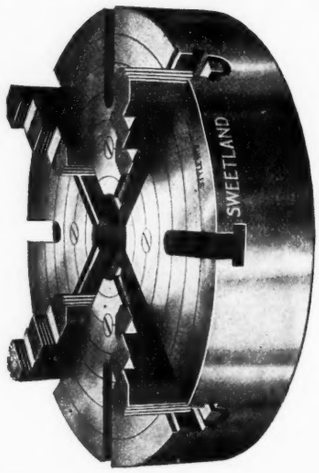
is what they all use. Order your metals to hardness specifications and save money. Also get your tools right. For further information and free book, write

Shore Instrument & Mfg. Company

555-557 West 22nd Street NEW YORK

SWEETLAND LATHE CHUCKS

MAKERS OF ALL KINDS OF LATHE CHUCKS



MANUFACTURED BY

HOGGSON & PETTIS

NEW HAVEN, CONN., U. S. A.

103 Chambers St., New York

Bound Volumes of Machinery

THE INDUSTRIAL PRESS

49-55 Lafayette St. - New York

Spur Geared Scroll Combination Lathe Chuck

If you want the best Lathe or Drill Chucks—buy Westcott's

Little Giant Auxiliary Screw Drill Chucks, Little Giant Double Grip Drill Chucks, Little Giant Improved Drill Chucks, Oneida Drill Chucks, Spur Geared Scroll Combination Lathe Chucks, Scroll Combination Lathe Chucks. Geared Combination Lathe Chucks, Geared Universal Lathe Chucks, Spur Geared Scroll Universal Lathe Chucks, IXL Independent Lathe Chucks, Cutting-off Chucks.

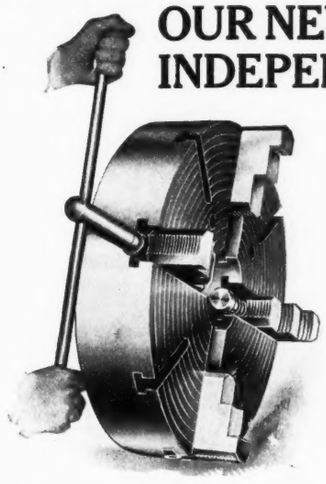
Strangest Grip, Greatest Capacity. Great Durability and Accuracy.

WESTCOTT CHUCK CO., Oneida, N. Y., U. S. A.

Ask for catalogue in English, French, Spanish or German

Little Giant Auxiliary Screw Drill Chuck

OUR NEW MODEL FOUR JAW INDEPENDENT CHUCKS



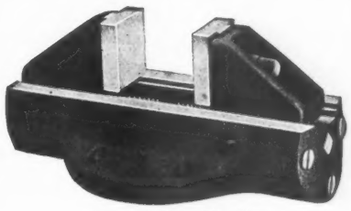
Our 1911 Price List shows full line of sizes, mailed on request.

are designed for modern work. Made stronger in every part, with wider jaws, larger screws, larger bearing surfaces, they have capacity for the heavier work required today. We even furnish unusually long wrenches for tightening the screws. No danger of breakage "when you put the screws on" this chuck. All steel or iron body as desired.

NEW PATTERN FACE PLATE JAWS AND BORING MILL JAWS are also on our list, and we'd like to show you an all steel **TWO JAW CHUCK** for turret lathe work.

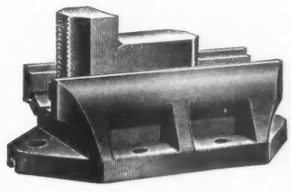
Ask for 1911 Price List.

S.E HORTON MACHINE CO.
WINDSOR LOCKS, CONN.
NOT THE E. HORTON & SON CO.



Two Jaw Box Chucks

TRADE S.E CHUCKS MARK



New Face Plate Jaws

Like all precision tools that bear our name

"Premier" Spring Dividers and Outside Spring Calipers

are extremely accurate and dependable.

Complete line of Spring Joint Calipers and Dividers, also Firm Joint Calipers, Steel Rules, Squares, Bevels, Vises, etc.

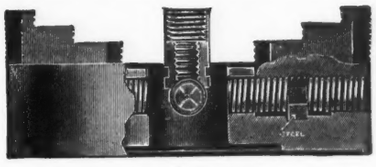
Ask for Catalog 31.

Athol Machine Co., Athol, Mass.

OUR SPECIALTY,

Automatic Machinery for making **Wood Screws**

Asa S. Cook Co., HARTFORD, CONN., U. S. A.



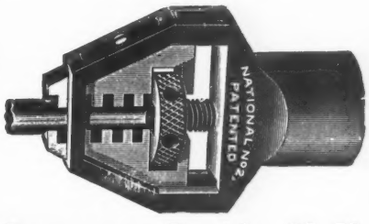
Solid Steel Rings Reenforce these Independent Lathe Chucks

Making them strong where other chucks are weak, providing for tensile stresses and screw thrusts, insuring greater durability and better service.

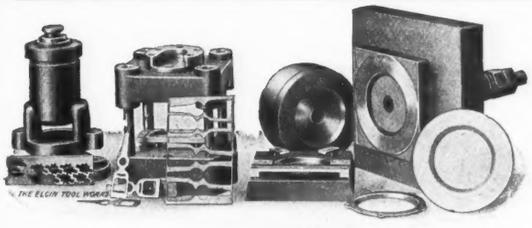
"National" Skeleton Body Drill Chuck

for highest speeds and heavy work. Made entirely of steel, perfectly balanced, unequaled drive and grip.

Write for catalog.



Oneida National Chuck Company, Oneida, N. Y.



We Build to Order
JIGS, DIES and TOOLS
as well as
Elgin Precision Bench Lathes and Attachments

The Elgin Tool Works
ELGIN, ILL.

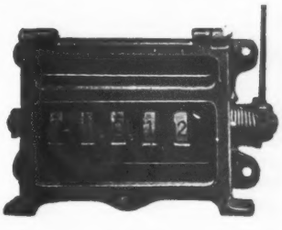
NOT IN A TRUST

HAYES FILE COMPANY, Detroit, Michigan

Use our SPECIAL SOLDER-CUT File, for filing Solder.

"Don't count your chickens before they are hatched." Count them when you are hatching them; it is often too late afterwards.

Our No. 4207 Counter is accurate, legible, and easily reset, and is large enough to stand rough usage. Saves labor of rehandling and counting. Counts up to 100,000. Size 5¾" x 4¾" x 2½". Net weight 4¾ lbs. Gross 5½ lbs. The price is $5.00 Net.



THE DURBROW & HEARNE MFG. CO.
Section 17. 11 Wooster Street, New York, N. Y.

A BIG THING
IN DRILL CHUCKS
THE MORROW

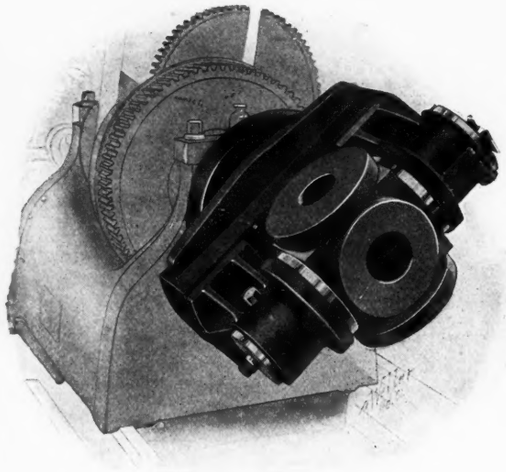
BIG because the largest sizes, with capacity from ¼" to ¾" and ½" to 1", can be released easily by hand, without the use of key, wrench or spanner. BIG because there is no other drill chuck made with capacity of 1" that can be operated by hand. BIG because the BIGGEST users of drill chucks, recognizing the TIME AND MONEY SAVING features of the MORROW hand operated drill chucks, are replacing all other makes with the MORROW. BIG because of the BIG and INCREASING demand for Morrow Drill Chucks all over the world. BIGGER yet, because the Morrow Ball Bearing, Self Tightening, Quick Releasing, Hand Operated Drill Chuck, for holding straight shank drills, is in a class by itself and has no competitor. What other drill chuck made will do what the MORROW does? The users all over the world answer NONE. Write for booklet. Made in five sizes.

Manufactured by

Morrow Manufacturing Co.

ELMIRA, N. Y.

UNION REVOLVING JAW CHUCKS



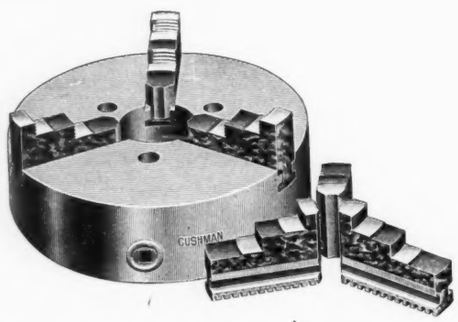
These chucks are designed for holding valve bodies, fittings, etc., where there are several faces to be machined at accurate angles to each other. The cut shows a large size chuck, holding valve body in position, and mounted on lathe spindle. Complete specifications furnished on application.

UNION MANUFACTURING CO.

26 Cortlandt St., New York **New Britain, Conn., U.S.A.**

Makers of a Complete Line of Chucks.

"CUSHMAN" CHUCKS



Our New Catalogue and Price List will be sent free on request.

This catalogue describes fully the line of chucks we manufacture, consisting of Heavy Pattern Lathe Chucks, Drill Chucks and Face Plate Jaws.

The Cushman Chuck Co.

39 Ann Street, Hartford, Conn.

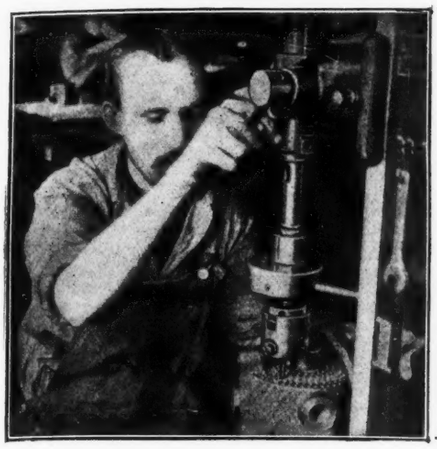
National Milling Cutters

GIVE LASTING SATISFACTION

No matter how severe the working conditions—because they are **designed right** and built to **stay right.** Their reliability and durability make them the cutters "par excellence" for efficient and economical service. Made from High Speed Steel and Carbon Steel. All sizes, all styles. Only one quality—the best.

THE NATIONAL TOOL CO.

Cleveland
Sixth City

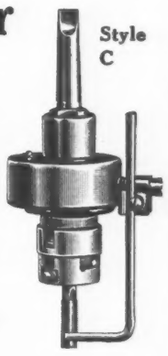


Errington Auto Reverse Friction Tapper

Tapping Blind Holes in Air Cooled Automobile Cylinders.
(American Machinist, March 14, 1907.)

The breakage of a single tap on this job would cause an intolerable blemish in the appearance of the piece and result in heavy loss in time and money. The **Errington Sensitive Adjustment and Quick Reverse** insure perfect results, regulate the power of the machine to just drive and remove all danger of **breaking the tap or injuring the work.**

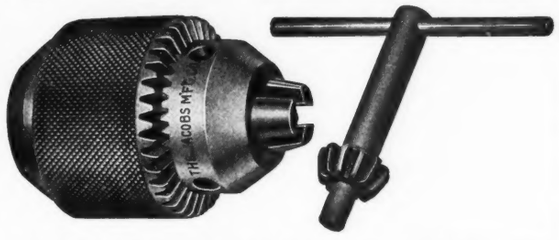
Fool proof, fits any drill press, and taps steel as safely as cast iron. Seven sizes, 3/8" to 2".



ERRINGTON, 39 Cortlandt St., New York

Deutsche Katalog von Arthur Kayser, Berlin, S. W., Alte Jacobstrasse, 24.
Catalogue Francais: Edgar Bloxham, Paris, 12 Rue du Delta.

QUALITY THE REASON



The REASON why more than 3330 Jacobs Improved Drill Chucks were purchased during March and April, 1911, is because their superior QUALITY has been demonstrated by seven years of unequaled service. Each part of the Jacobs Chuck is fully guaranteed.

Write today for our new illustrated catalog.

The Jacobs Manufacturing Co., Hartford, Conn.

"CLOVER" INK STAND

Just the thing for holding ink bottles of various sizes and shapes. Cannot be upset. Each bottle held independently, and any bottle instantly removed by opening clasping spring.

Sent postpaid for 35 cents

Write for our Catalog of Drawing Materials and Surveying Instruments.

KOLESCH & COMPANY
ESTABLISHED 1885
138 Fulton Street NEW YORK CITY

Pratt Drill Chucks Save the Workman's Time

You know why the ordinary drill chuck is so wasteful of time. Pratt Chucks are different. The flattened drill head is inserted into a patented equalizing driver in the body of the chuck, and all rotating effort is exerted by this driver.

The jaws are tightened only enough to center the drill and hold it in the driver. Drills are easily placed and as readily removed—simply can't slip—shanks are never marred or broken.

Drill makers furnish flat-heads without extra charge—so specify Pratt Drill Chucks in your next order.

Glad to send you booklet and detailed information.

The Pratt Chuck Company
FRANKFORT, N. Y.

EUROPEAN AGENTS: Selson Engineering Co., Ltd., 85 Queen Victoria Street, London, England.

This One

Is well adapted for machine reaming. Furnished with either straight or taper shanks. A fine adjustment possible without removal from machine. It is fitted with carbon steel or high speed steel blades as preferred. The blades are made interchangeable, and when worn out can be replaced. Cost of up-keep low. All sizes carried in stock.

Our catalogue, which tells about our full line of reamers, will be sent upon request.

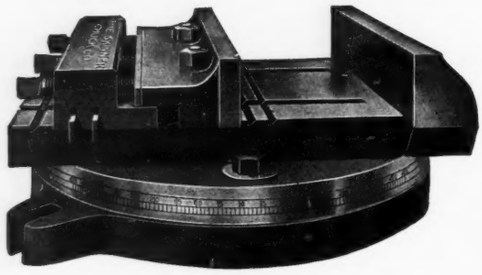
THE SCHELLENBACH-HUNT TOOL CO., Cincinnati, Ohio

THE AMERICAN SPECIALTY COMPANY, Chicago, Ill., Agents for the Chicago District.

FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London, England. Markt & Co., 193 West St., New York, Germany and Italy. New York Export & Import Co., 133-137 Front St., New York, China, Japan and Australia. Williams & Wilson, Montreal, Canada. J. S. Cock, Christiania, Norway.

The Skinner Planer Chuck and Drill Press Vise

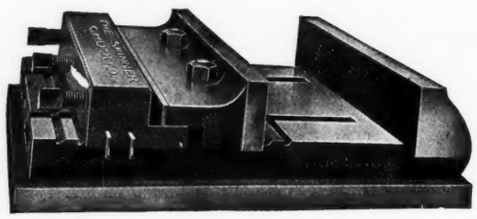
Will Soon Pay for Themselves in Any Shop. **Convenient, Powerful and Durable.**



Round Base Planer Chuck

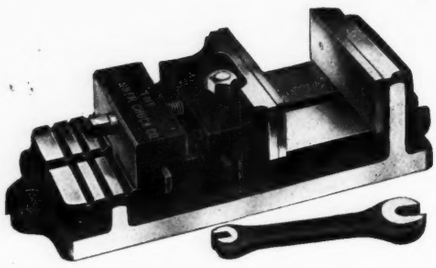
All sizes in stock.

Write for new **1911** Price List.



Square Base Planer Chuck

We Make Lathe Chucks and Drill Chucks



Drill Press Vise

Also Reversible Face Plate Jaws, Assembling Stands, Etc., Etc.

New York Office: 94 Reade Street **The Skinner Chuck Co.** NEW BRITAIN, CONN., U. S. A.

You can use those broken-shank drills in Coit's Ball Bearing Drill Chuck

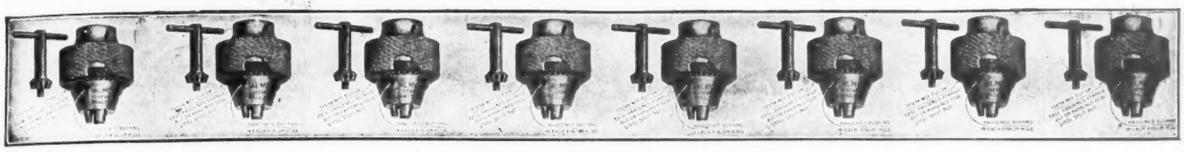
A grip of three-quarters of an inch is all the round jaws need to hold them just as securely as full length tools.

The Coit has self-tightening jaws, the greater the resistance the more positive their grip, moreover the drills are never broken nor are their shanks "chewed" out of shape.

No "extras", any size mandrel, either straight shank or Morse taper, will be furnished.

THE STANDARD MACHINERY CO.

MYSTIC, CONNECTICUT, U. S. A.



For Fussy Folks

The Almond Geared Nut Chuck

Its simple, sensible and substantial construction will impress you.

Its modern features, providing for the longest service and the least wear, will convince you.

A study of its tightening method, increased leverage, direct power, will prove why easiest to operate and most convenient.

Its satisfying simplicity and progressive principles will please you.

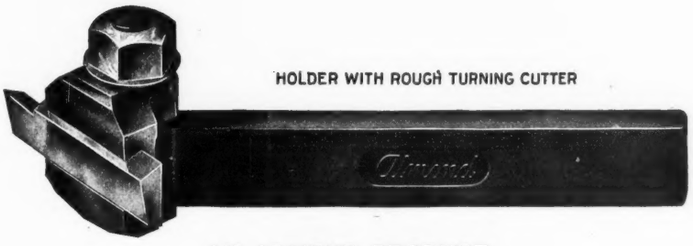
AN ALMOND PRODUCT

Two-color Descriptive Booklet Mailed Promptly

CHUCK BUILDERS FOR THIRTY YEARS

There's Nothing Ordinary About

The Almond Universal Tool Holder



AN ALMOND PRODUCT

Has Almond individuality—this means highest efficiency, greatest convenience.

Its practical style of cutter is an advantage over other multi-purpose holders.

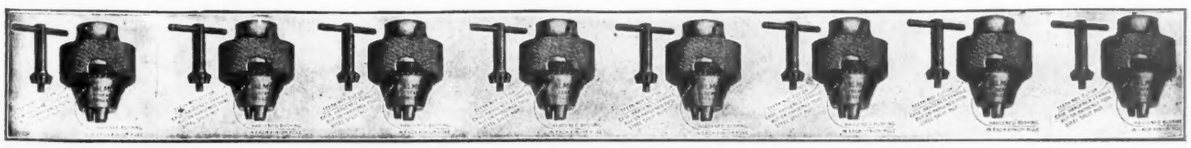
Open face at cutting point. Strongest and best clamping device. 5 positions for each tool.

And—many other Almond advantages, which are shown in booklet illustrating holder and cutters in action.

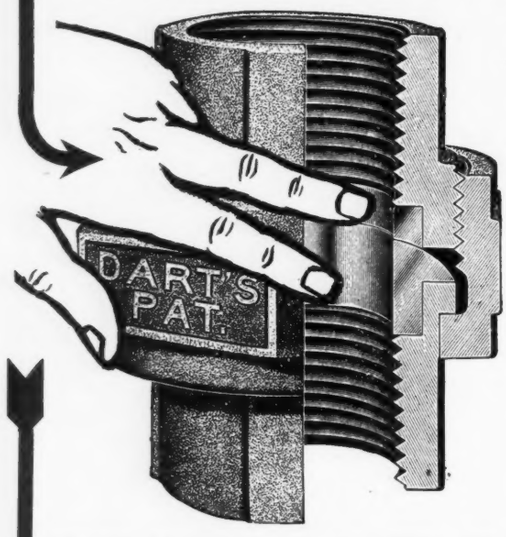
T. R. ALMOND MANUFACTURING COMPANY

2 Maple Avenue **ASHBURNHAM, MASS.**

LONDON OFFICE—8 White Street, Moorfields, London, E. C.



EXAMINE "DART" UNIONS



for the "Bronze to Bronze" seats, well ground together, making an always perfect joint, which cannot rust or corrode.

Note the heavy malleable pipe ends, heavy shoulders and nut — extra strength and value in every way.

Have you seen the samples yet?

E. M. DART MFG. CO., Providence, R. I.

There is nothing better than the Best

Oil and Tar Burners

for Locomotive, Marine and Stationary Boilers.

Furnaces

for Melting and Heat-treatment of Metals.

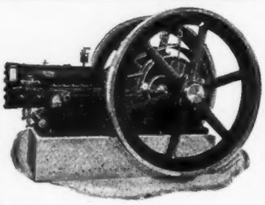
W. N. BEST, 11 Broadway, New York City

FOOS

OIL ENGINES
6 to 90 H. P.

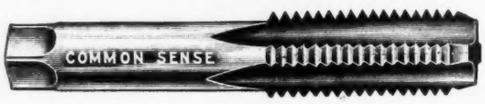
Operating cost 50 to 75 per cent less than the average cost of gasoline or steam power. On oil at 2 1-4 to 7 cents, Foos Engines develop the same horse power that other engines obtain from gasoline at 12 to 15 cents. Ultimately the difference in fuel consumption repays the entire original cost of the engine.

Structural details and fuel data are fully covered in Bulletin O. B.—12



The Foos Gas Engine Co.
102 Linden Ave., Springfield, Ohio

BRUBAKER TOOLS HELP



to save time, labor and money, because with their aid, you can obtain quicker, better and therefore more economical results. A trial will not only prove our claims but will be money in your pocket.

Our catalogue—sent on request—is an index to the Brubaker Line.

W. L. Brubaker & Brothers, Millersburg, Pa.

F. E. Harrison, Eastern Representative, 50 Church Street, New York.

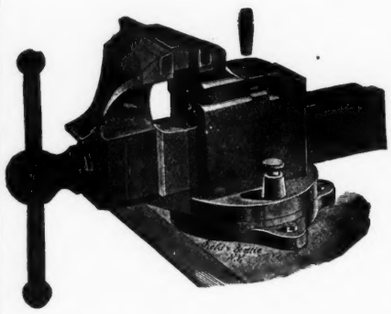
Finished Machine Keys

Gib and Plain Head

All sizes carried in stock. Write for discounts.

Cheaper than you can make them. Finished "Ready to Drive."

OLNEY & WARRIN
66-68 Centre St., New York



Machinists' Swivel Vise

with self-adjusting jaw that is as strong and durable as any solid jaw, and a Swivel Bottom that gives any desired adjustment to right or left, and is solid and firm at any angle. We make all sorts of good vises, and have been leaders in this line for twenty years. Send for catalogue and price list.

Prentiss Vise Company
106-110 Lafayette St., New York

Agents for Great Britain, Chas. Neat & Co., 112 Queen Victoria St., London, E. C.

WROUGHT STEEL BAR COMBINATION BASE

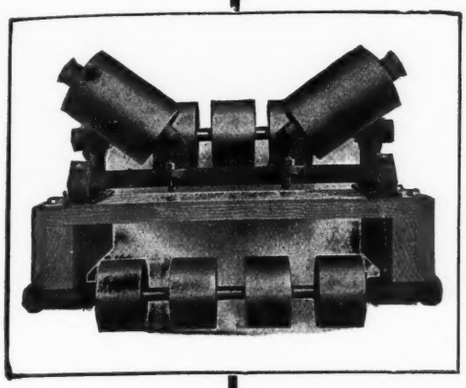
MERRILL BROS., MASPETH, NEW YORK, N.Y.

SECTIONAL BLUE PRINT
FILING CABINET

You can buy one section or ten and add to them as your business demands. Perfectly made of best oak. These cabinets can be used for a variety of purposes, and should be in every office. We also make all kinds of draughting-room furniture and our prices are right. *Send at once for our descriptive matter and prices.*

FRITZ MANUFACTURING CO.
60 Alabama St. GRAND RAPIDS, MICH.

ORIGINAL
ROCKWELL FURNACES
For ANNEALING, TEMPERING, HARDENING, MELTING, Etc.
FUEL OIL APPLIANCES
Catalog 21 for the asking.
W. S. ROCKWELL CO. 50 CHURCH ST., NEW YORK



Improved Belt Conveyers

We manufacture Improved Belt Conveyers of several styles, troughing the belt or running it flat, as conditions may warrant. These conveyers are economical of power, simple in design, capable of running 24 hours per day, and require little time or attention from any one. There's no harm in writing us. *Send for Catalogue No. 34.*

H. W. Caldwell & Son Co. Western Ave. 17th-18th St. Chicago

NEW YORK: Fulton Bldg., Hudson Terminal, 50 Church St.

ALLEN'S TOOL STEELS

HIGH SPEED AND CARBON

Are Sheffield-Made and Thorough!

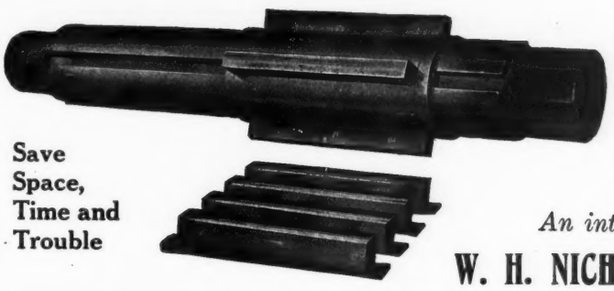
RIGHT QUALITY PRODUCTS FOR EVERY PURPOSE
IMMEDIATE SHIPMENTS FROM STOCK

EDGAR ALLEN & COMPANY, Limited

Imperial Steel Works, Sheffield, England

CHIEF AMERICAN OFFICE: 434 WEST RANDOLPH STREET, CHICAGO, ILL.

Replace that Pile of Solid Mandrels with the "Nicholson Nine"



Save Space, Time and Trouble

Sell your junk pile—that's what it amounts to—buy a set of Nicholson's Expanding Mandrels and your troubles on the mandrel question will be ended. When you want a mandrel in a hurry, the right one is always ready—no hunting or fitting, no lost time and lost temper. Any hole from 1″ to 7″—remember NICHOLSON.

An interesting Catalogue is also ready for you.

W. H. NICHOLSON & COMPANY, Wilkes-Barre, Pa.

FOREIGN HOUSES—C. W. Burton, Griffiths & Co., London. Schuchardt & Schutte, Berlin, Cologne, Vienna, Brussels, Stockholm, St. Petersburg.

Cost Comparison is the Judas of Good Judgment

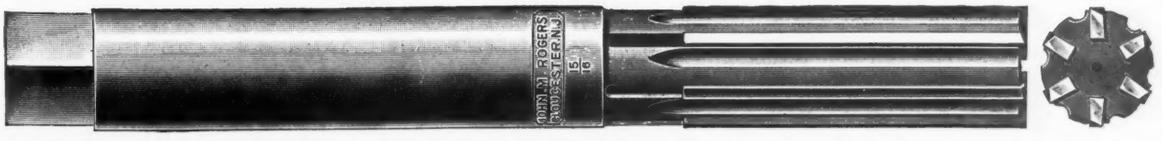
Take the question of home-made or solid reamers vs. **Rogers Adjustable Blade Reamers.** A comparison of the cost per unit of good, accurate work produced by each, puts first cost out of the running.

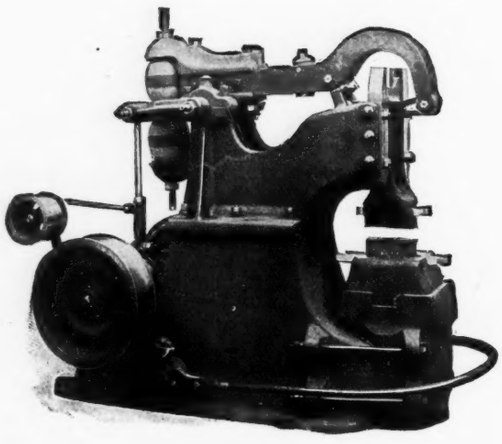
The blades of a **Rogers Adjustable Reamer** may be ground and reground, and the tool still maintain exact sizes. Saves time, gives twice the service and outclasses solid reamers on every point.

Keep our Small Tool Catalogue No. 7 and List of High Speed Reamers handy.

THE JOHN M. ROGERS WORKS, Inc., Gloucester City, N. J.

FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, E. C. C. W. Burton, Griffiths & Co., London, E. C.
De Fries & Co., Dusseldorf, Germany. V. Lowener, Copenhagen, Denmark.





Bradley Upright Hammers

Are made with heads weighing 15 to 500 pounds. Each contains one-third to one-half more material than those of any other make of the same rating.

Their anvil blocks weigh nearly or quite double those of other hammers.

Their output is guaranteed 25 per cent. greater than is possible with other hammers of same rating or no sale.

More Bradley Hammers are sold each year than all other power hammers combined.

WE MAKE

The Bradley Cushioned Helve Hammer. The Bradley Upright Helve Hammer.
The Bradley Upright Strap Hammer. The Bradley Compact Hammer.
Forges for Hard Coal or Coke.

SEND FOR CIRCULARS

C. C. Bradley & Son, Syracuse, N. Y., U. S. A.

FOREIGN AGENTS: Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. Buck & Hickman, Whitechapel Road, London.

Star Hack Saw Frame

The Star Hack Frame is light, handy and one of the strongest tools of its sort that is now on the market.

It is quickly adjusted and has that combination of lightness with a maximum strength that is so indispensable in a tool of this description.

The strength of the Star Frame is due to its simple and sensible construction, and to the fact that the greatest strength of the tool is concentrated where the greatest strain comes—in the center of the frame.

The steel is tempered and the appearance of the frame is excellent.

This tool is adjustable to carry blades 6, 7, 8, 9, 10, 11 and 12 inches long.

Send for the free book "Tool Practice"

MILLERS FALLS CO.
28 Warren Street New York

Erie Steam DropHammers

400-lbs. to 7000-lbs.

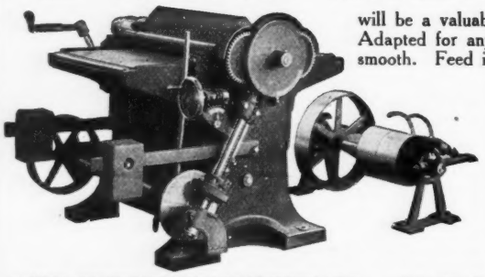
Steel Anvils and Frames.

Forged Steel Rams and Sow Blocks.

Piston and Rod forged solid from 3½ per cent. Nickel Steel.

Erie Foundry Co.
Erie, Pa., U. S. A.

THE CRESCENT VARIABLE FEED PLANER

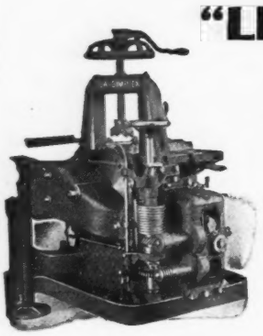


will be a valuable machine in your pattern shop. Adapted for any kind of planing, from rough to smooth. Feed instantly changeable from 125 to 50 feet per minute. Built in two sizes, 18" and 24". Complete description on pages 65 to 73 of our 1910 catalog. If you do not have it, send for copy today. It tells about our line of Band Saws, Saw Tables, Jointers, Borers, Shapers, Planers, Planers and Matchers, Disk Grinders, Variety Wood Workers.

THE CRESCENT MACHINE CO., 56 Main Street, Leetonia, Ohio

"LEA-SIMPLEX"

COMPACTNESS

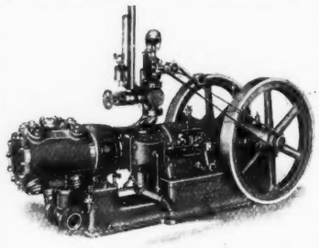


Solid, self-contained compactness distinguishes the "Lea-Simplex" Cold Metal Saw, meaning a saving of floor space. But this compactness is not had at the cost of accessibility, for all important parts are easily reached for inspection or adjustment.

LEA EQUIPMENT COMPANY, 93 West Street NEW YORK

"Dallett" Air Compressors

Have created a standard of quality excelled by no other



Particularly reliable, and adapted for hard, continuous service, under all conditions.

Send for our Literature

THOS. H. DALLETT CO.
York and Twenty-third Streets, PHILADELPHIA, PA.

The Beaudry Champion Power Hammer

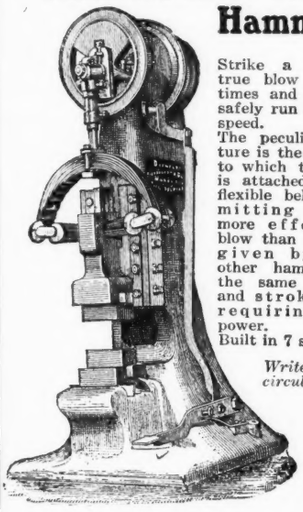
Simple
Durable
Efficient
Economical

Adapted for every description of forging

Send for circular

BEAUDRY & CO., Inc.
141 Milk Street, BOSTON, MASS.

"Dead Stroke" Power Hammers



Strike a square, true blow at all times and can be safely run at high speed.
The peculiar feature is the spring, to which the ram is attached by a flexible belt, permitting a far more effective blow than can be given by any other hammer of the same weight and stroke, and requiring less power.
Built in 7 sizes.

Write for circulars.

MANUFACTURED BY
Dienelt & Eisenhardt, Inc.
1304 No. Howard St.
Philadelphia, Pa., U. S. A.

COUNT THE COST
by keeping tabs on the production of each machine. Counters for every purpose accuracy guaranteed.
Catalog 27.
THE C. J. ROOT COMPANY. Bristol, Conn.

Bell Steam Hammers

These famous Hammers have been making a name for themselves, since 1868, at all times leading in design construction. They still retain it. They are extra strong, all castings used being of special, high tensile, shock resisting metal. Heavy and massive design, with proper distribution of weight, makes them exceptionally rigid and well calculated to

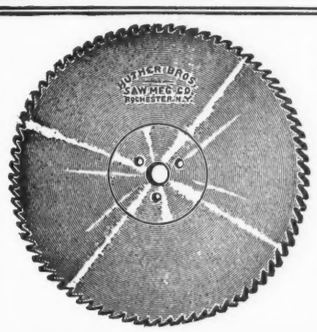
Stand the Strain

of long, hard service on the toughest grades of steel. No danger of jarring the sensitive control out of adjustment. All types of Bell Steam Hammers can be operated as well by compressed air as by steam. The improved balance valves used may be operated automatically, or by hand. The control is very sensitive and there is nothing to get out of order.

Catalogue or special circulars on request.

Single Frame Guide Type

Buffalo Foundry and Machine Co.
63 Winchester Avenue, BUFFALO, NEW YORK

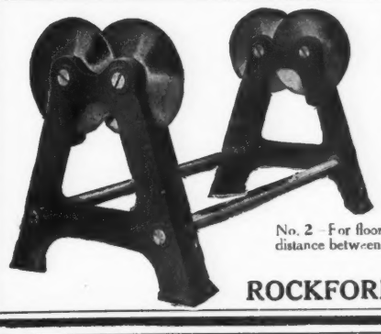


MILLING SAWS
And Cutters

Saws made from High Speed and Carbon Steels.

LET US SEND YOU ONE TO COMPARE RESULTS OBTAINED.

Huther Bros. Saw Mfg. Co.
ROCHESTER, N. Y., U. S. A.
We also Manufacture Sheet Steel Specialties.



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Always Level—No matter where or how you place it. Always ready.

A practical tool for balancing pulleys, cones, polishing wheels, etc., requires no leveling or adjusting. Two sizes—No. 1, for bench use, will balance 22" pulley. Greatest distance between standards 20". Net price $15.00.

No. 2—For floor use balances work up to 46" diameter. Greatest distance between standards 30". Net price $18.00.

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Only the very best, that is—the most uniform, the most dependable crucibles SHOULD be used. If you don't USE ours, it's because you don't KNOW ours. Let us show you?

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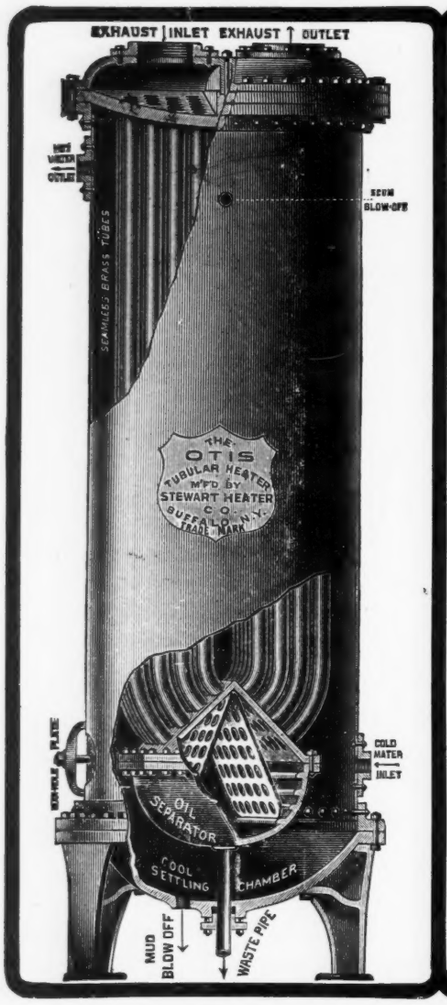
McCULLOUGH-DALZELL CRUCIBLE COMPANY, - - - PITTSBURGH, PA.



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Tubular Feed Water Heater, Oil Separator and Purifier

is not an experiment but a tried and trusted appliance that the makers are not afraid to

GUARANTEE

To heat the feed water to the *boiling point* (210 to 212 degrees) with the exhaust steam without causing any back pressure, *also to extract the oil from the exhaust*, so that the exhaust steam after being passed through the heater can be used for heating purposes, and the water of condensation for the heating system be returned to the boiler without the *additional expense* of an *eliminator*.

We are so sure of the OTIS that we agree to pay all cost of a trial—freight, cartage, piping, etc.—if it fails to do all we claim for it.

Catalogue and Prices at your Service

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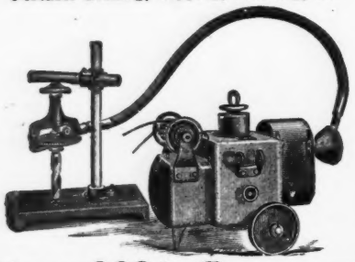
Combination of

Stow Flexible Shaft

and

Multi-Speed Electric Motor

Portable Drilling, Tapping, Reaming, etc.



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Pat. July 29, '07.

HANDY OIL AND GREASE CUPS

No plugging up.
Oil tight and dust proof.

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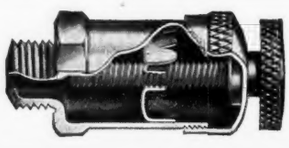

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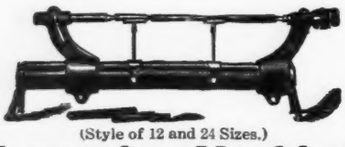
DROP FORGINGS

THAT ARE STRONG

FORGED WITHOUT WELDS

WORCESTER MASS. CLEVELAND OHIO.



(Style of 12 and 24 Sizes.)

Measuring Machines

Measuring screw, 10, 16 or 20 threads to the inch, graduated to read thousandths or 32ds without calculation.

THE ONLY MICROMETER THAT WILL NOT LOSE ITS ACCURACY BY WEAR.

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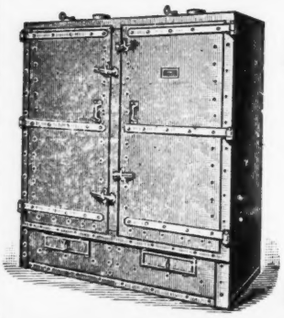

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Designed to meet special conditions. Heated by gas, and adaptable for many lines of manufacture. Special burners used for drying materials containing much moisture.

Ovens for

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Made in any size required. Send for Catalogue No. 2.

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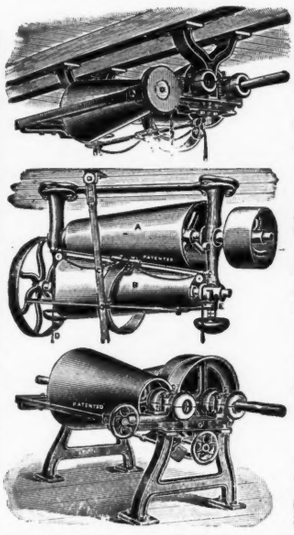
Evans Friction Cone Pulleys
VARIABLE SPEED COUNTERSHAFTS



Will drive your machine at any desired speed from 1 to 6. Over ten thousand now in operation in this country and Europe. Send for Catalog. **G. F. Evans, Newton Center, Mass.**
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POWER

Is your Engine or Motor developing its full power? You don't know unless you know the speed you are attaining.
Why not determine this by taking readings occasionally with the

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SPEED COUNTER

Price $3 each. Fully Guaranteed.

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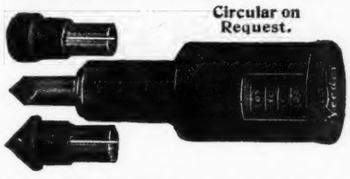

Straight Reading, Non Magnetic, Ball Bearing, Clutch Mechanism which insures accurate readings.

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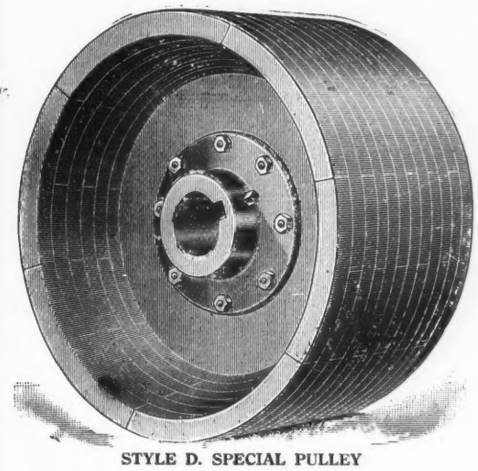
Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Die Castings.

Save Power and Cut Down Your Belt Expense



STYLE D. SPECIAL PULLEY

GILBERT WOOD SPLIT PULLEYS

by permitting perfect contact reduce the belt tension, reduce friction of the journals and relieve the strain on the shafting.

The hard polished wood face of the Gilbert Pulley gives an ideal belt surface—the pulley is correctly balanced, runs true, is easily put on or taken off the shaft, stands a high degree of heat or moisture and is not easily affected by shock or compression.

Style D. is a special pulley, particularly adapted for Dynamos, Trip Hammers and other severe service, and is the lightest, strongest, stiffest and best finished Dynamo pulley on the market.

Copy of new illustrated catalogue on request

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Saginaw, W. S. Michigan

SALES AGENCIES IN ALL THE PRINCIPAL CITIES IN THE WORLD

New York Branch, 88 Warren Street. Chicago Branch, 105-109 North Canal Street.
Cable Address, Engrave. A. B. C. and Lieber's Codes.

The Draw-Cut Machine Saw

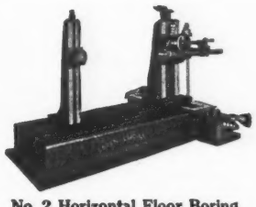
Prevents blade buckling, cuts straighter and with least wear. Geared drive, power feed, automatic trip and roller guides. Stroke of blade adjustable—blade relieved on out stroke. Saw frame of ample proportions, with babbitted bearings traveling on two guide rods—bearings easily re-babbitted when worn.

FOUR SIZES:
6" x 6", 7" x 7", 10" x 10", 12" x 12".

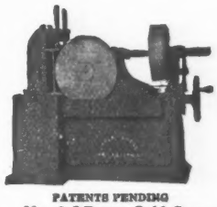
Get circular.

H. T. STORY
122 N. Curtis St., CHICAGO

No. 7 Bar Cold Saw



No. 2 Horizontal Floor Boring Milling and Drilling Machine.



PATENTS PENDING
No. 2 I-Beam Cold Saw

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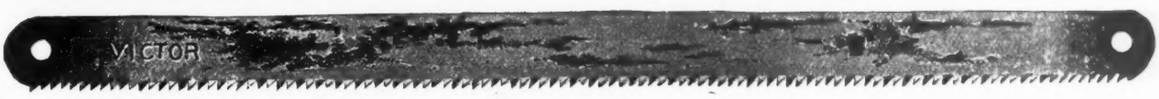
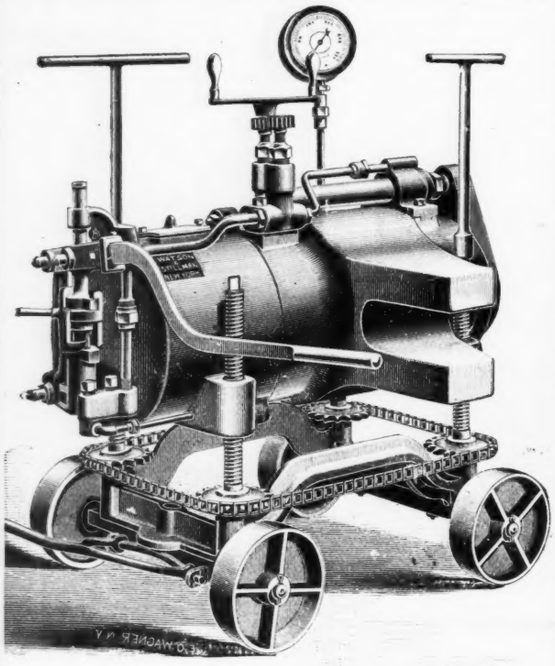
ESPEN-LUCAS MACHINE WORKS
Front and Girard Sts., PHILADELPHIA, PA.



VICTOR HACK SAW BLADES GIVE BEST SERVICE

Free samples for your own tests under your own conditions

MASSACHUSETTS SAW WORKS. - - - CHICOPEE, MASS., U. S. A.



This Hydraulic Press is good for many services.

You can't imagine a more powerful and portable tool of its kind. We designed this machine originally for engine shop work but it is useful for any forcing work — takes off a gear in the shop one day and can be applied in the power house with equal facility the next. Several sold recently are being used for straightening castings.

We make various types of these tools for all powers from 60 to 300 tons and all are very complete. The whole tool can be raised or lowered by putting a socket wrench on any one of the elevating screws. On the large sizes, the ram is operated by a double plunger pump and is driven forward to its work by the low pressure piston at four times the working speed, and a special pull back cylinder is provided for returning the ram. The valve arrangement permits throwing the pump delivery to pressure or return cylinder as desired.

We furnish, when desired, suitable rods and beams with each press to keep the alignment true and facilitate setting on large work.

W-S HYDRAULIC TRADE-MARK

Tell us where you need hydraulic tools and we will quote prices.

The Watson-Stillman Co.

ENGINEERS, BUILDERS OF HYDRAULIC TOOLS AND TURBINE PUMPS

192 Fulton Street, NEW YORK

73

Lane Steam Hammers

All types and sizes.

Single Frame— 200 lbs. and up

Steam Drop— 600 lbs. and up

Steam Gravity Drop— 600 lbs. and up

Also special hammers for forming steel wheelbarrow trays, drag scrapers, etc., etc.

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STEAM HAMMERS

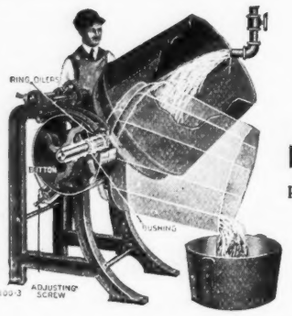
"All sizes for every class of service and work"
STEAM DROP HAMMERS OUR SPECIALTY

Chambersburg Engineering Co.

CHAMBERSBURG, PA., U. S. A.

Trimming Presses—Flanging Presses, both Four Post and Sectional Types. Hydraulic Riveters—Cranes—Accumulators—Pumps—Punches—Shears

HYDRAULIC MACHINERY



BAIRD

Baird Tumblers

permit—

Filling barrel,
Tilting barrel,
Emptying barrel,
Examination of goods,

All Without Stopping the machine.

Bulletin 300?

THE BAIRD MACHINE CO., Oakville, Conn., U.S.A.

Built in large quantities and carried in stock
R. Cruickshank, Ltd., Birmingham, England

BLISS

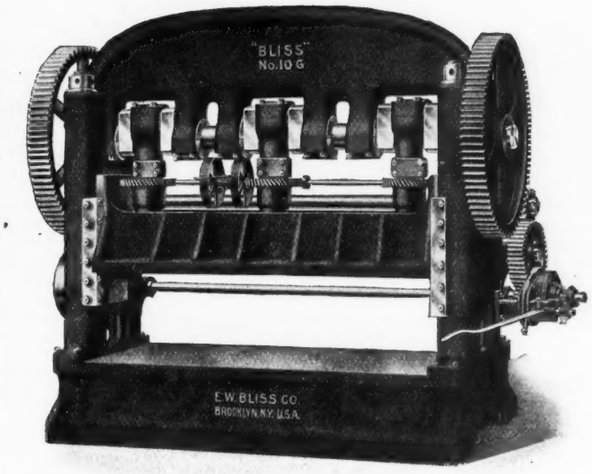
Straight-Side and Overhanging

Bliss Double and Triple Crank Presses

BLISS

150 SIZES AND STYLES

Correct Proportions — Heavy Shaft — Well Gibbed Slides



Bliss No. 10 G Triple Crank Press, built up type. 14 fe t between housings. Adapted or the heaviest cutting, bending, forming and stamping operations in the manufacture of heavy sheet metal parts.

These presses are used extensively in the manufacture of sheet iron and steel goods such as automobile parts, vapor stoves, wrought iron ranges, agricultural implements, paneled ceilings, metal doors, window frames, metal furniture, shingles, drip pans, armature disc cutting; also for operating gang punching dies. They are also arranged for forging purposes in the manufacture of hoes, hammers, mattocks, axes, pickaxes, adzes, and similar work.

They are fitted with Pin, Friction or Jaw Clutches, and arranged for either belt or direct motor drive. Write for Catalogue 8 K, which describes these presses.

"We Build Presses for Every Purpose"

E. W. Bliss Company

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Inclined Column Embossing Press E 15 is designed for embossed or formed "push-out" work, the product sliding down chute at back. The frame is rigid, being cast in one piece with solid columns. One larger size and four smaller sizes. Also six sizes with gearing. *Send for photographs and full information.*

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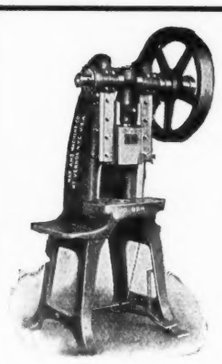
EUROPEAN AGENTS: Chas. Churchill & Co., London. Fenwick Freres & Co., Paris. Wilh. Sonesson & Co., Copenhagen.

Press E 15



No. 924 Open Back

AMS PRESSES

ALL 1911 MODELS

Every well equipped shop rejoices in having one.

Must be a reason.

Ask the man who uses them, then write for our catalog.

MAX AMS MACHINE COMPANY, Mount Vernon, N. Y., U. S. A.

The HIGLEY

COLD METAL SAW

Catalog furnished by

Vandyck Churchill Co.

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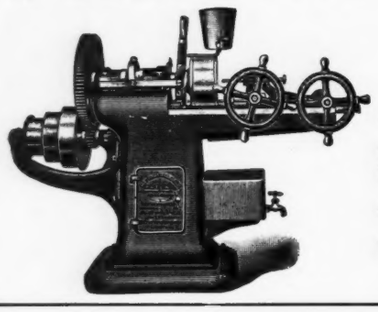
A BOLT CUTTER IS MUCH LIKE A MAN IN THIS: The Head is Nearly Everything



The Merriman Bolt Cutter Head is Noted for

1. Simplicity of the head; only four parts, consequently,
2. Great Durability; few repairs needed.
3. Square Bearing of the Dies in the Ring; consequently,
4. Solidity of the Dies like a Solid Die;
5. Uniformity of the product; bolts all the same size.
6. Effectiveness of operation; cheapest help can understand and run it.
7. No machine turns out work more rapidly.

THE H. B. BROWN CO., EAST HAMPTON, MASS.

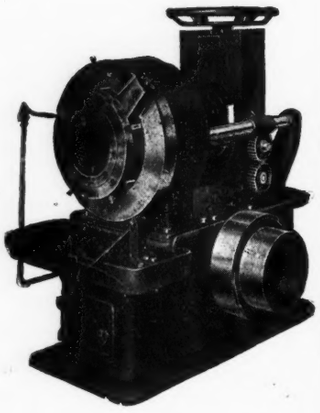
Send for Catalog No. 12.

FULL, CLEAN, PERFECT THREADS AT ONE CUT

Pipes threaded in **"Loew-Victor" Machines** are accurate and tight-fitting. Any burrs that may have turned up are removed automatically in the die head, and the pipe is turned out in first-class shape, ready for use.

"Loew-Victor" Machines are neat appearing, solidly built, and as nearly automatic and noiseless as a pipe machine can be.

Ask about the special points of merit.



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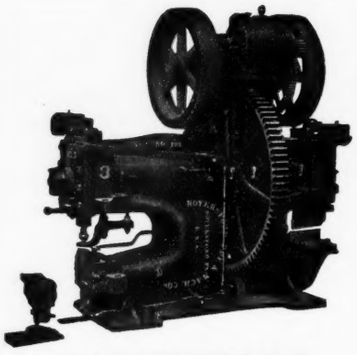
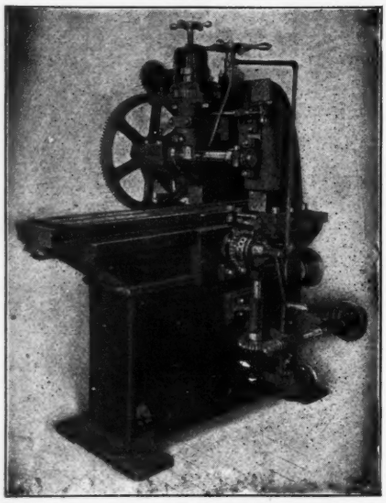


ROYERSFORD PUNCH AND SHEARS

None better—few as good. Just the machine for Boiler Shops, Railroad Shops, Structural Works and Machine Shops. Machine is right; so is price.

Ask for the New Catalogue.

Royersford Foundry & Machine Co., Inc.
ROYERSFORD, PA.



No. 5 Keyseat Milling Machine

Heavily built, powerful and adapted to a wide variety of milling other than keyseating. The construction of this tool represents the stiffest form for resisting strains incident to high speeds and fast feeds. Routing attachment has independent vertical and horizontal adjustment and when not in use can be raised so as not to interfere with the operation of the horizontal spindle.

A rapid producer of first-class work. Write for circular.

JOHN T. BURR & SONS
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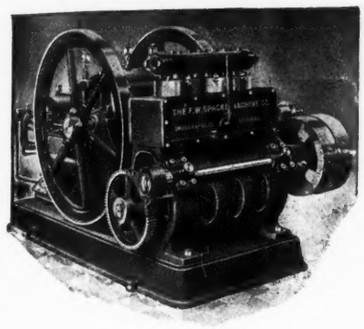
Gorton Engraving Machines

For engraving metal plates, dies, patterns, etc.—relief or sunken—in quick time and at small cost. *Write for details.*

Geo. Gorton Machine Co., Racine, Wis.

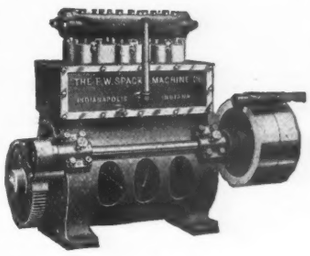
RADIAL DRILLS and ENGINE LATHES

THE JOHN B. MORRIS MACHINE TOOL CO., CINCINNATI, OHIO, U. S. A.



The Spacke Air Compressors

Are especially well constructed and will stand severest service. All parts are readily accessible, valve construction the latest, materials the best, and a minimum cylinder clearance is a point of vantage that greatly increases their efficiency.



Adapted for all service requiring air compressors of capacity from 1 to 100 cubic feet free air per minute. Particularly suited for the automobile garage or for driving small pneumatic tools in the machine shop.

Glad to send bulletins and full details.

The F. W. Spacke Machine Company, Indianapolis, Ind., U.S.A.

Automobile Transmission Gears Special department for this division of our business. Estimates furnished. **Automobile Motor Gears**

Delphos Non-Overflowing Factory Dispensers

DESIGNED FOR

Cleanliness — Convenience — Economy

Note the handy little shelf formed by the open cover of the Delphos. It does away with standing greasy oilers on the floor.

The double-tube inlet and outlet system of the Delphos prevents waste, as it siphons oil back into the tank before it can overflow.

Hand-made and steam-tested, the Delphos is proof against rough usage and leakage.

Uses any oil. Fills any style oiler. **Made in 3, 5, 10 gallon sizes.**

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THE DELPHOS MFG. CO.
DELPHOS, OHIO

MORE AVAILABLE POWER UNITS PER DOLLAR

than other compressors of similar size and speed is the record of the

Curtis Air Compressor

Sustained high volumetric and mechanical efficiency are the reasons why.

Due mainly to the efficient water cooling of cylinders, heads and valves, insuring low temperature, smaller drop in pressure and less power required. Also to few working parts, no stuffing boxes or cross heads. Also to large port area, light disc valves and small piston clearances.

There are other reasons, let us explain them to you.

CURTIS & CO. MFG. CO.

New York Office, 30 Church Street **1568 KIENLEN AVE., ST. LOUIS, MO.**

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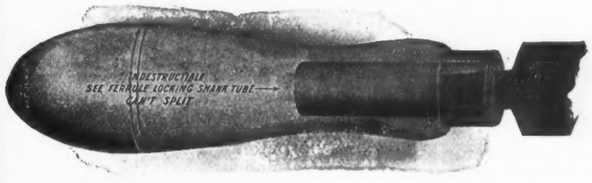

You must be—with any file handle except the Osgood Indestructible—because the ordinary handle is liable to split at any moment. Short-lived, common handles must be replaced frequently—"Osgood" handles give long and satisfactory service because the steel tube, inserted in the handle, takes the pressure of the file shank, and is an insurance against breakage.

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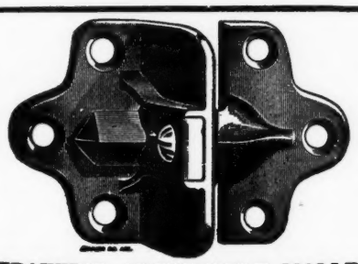

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saves time, expense, and makes true castings. Quickly applied and easily adjusted.

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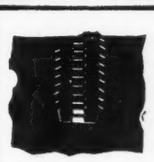

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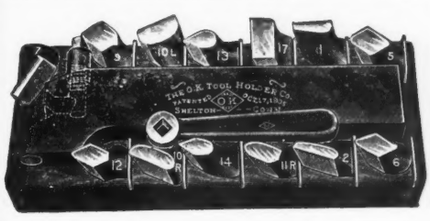

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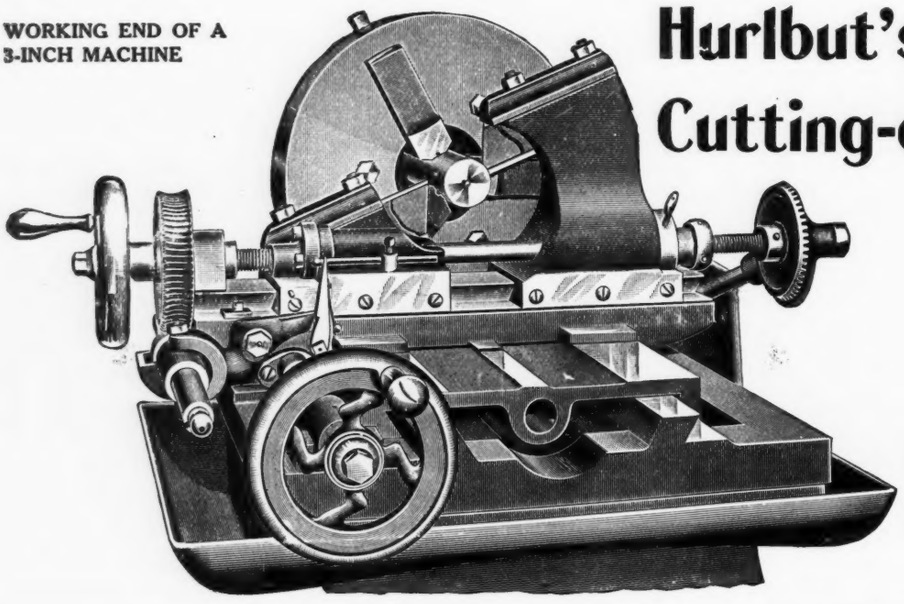

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Made in 2-inch, 3-inch, 4-inch, 5-inch, 6-inch, 8-inch and 10-inch sizes.

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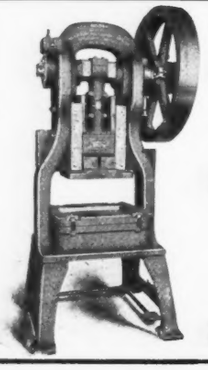

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Pipe Threaders and Cutters

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Single speed pulley; all gear speed changes through semi-steel cut gears.

Deep chasers cutting long taper perfect threads in one cut as easily on steel as on iron pipes.

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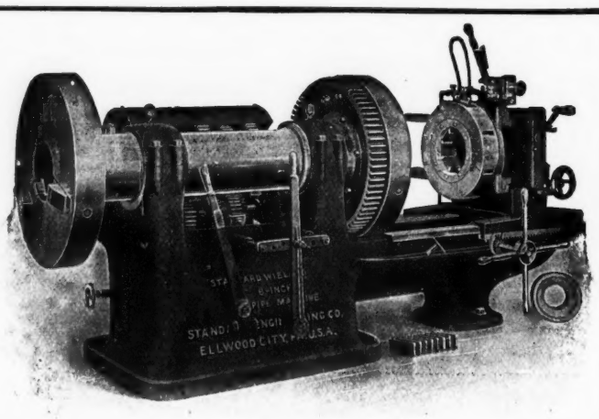

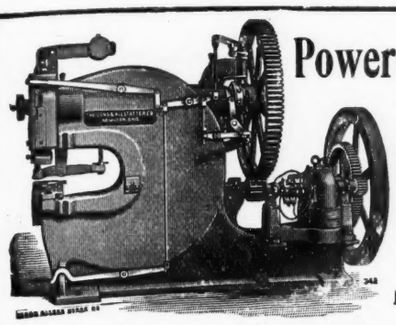

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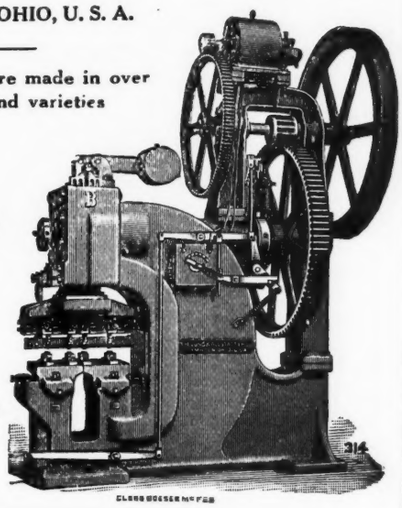
Etc.



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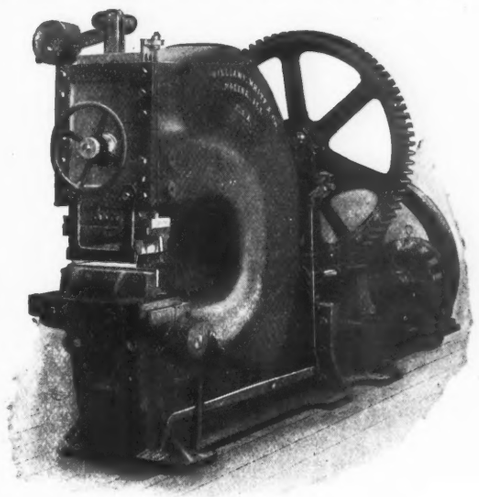

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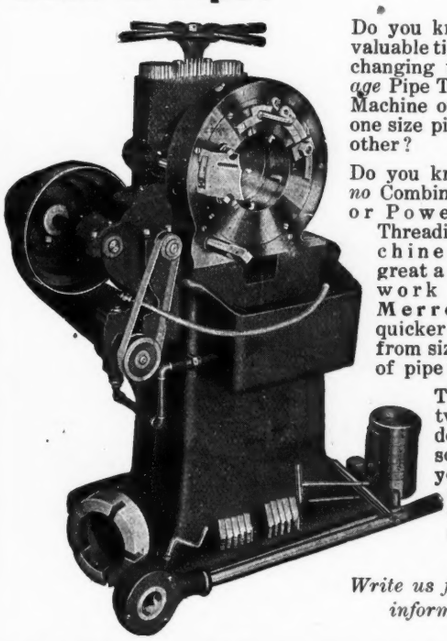

Do you know that valuable time is lost changing the *average* Pipe Threading Machine over from one size pipe to another?

Do you know that *no* Combined Hand or Power Pipe Threading Machine has so great a range of work as the **Merrell**—and quicker changes from size to size of pipe?

These are two of a dozen reasons why you should try out the Merrell.

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The distance from bed to slide and the length of slide and adjusting screw, special features of all Swain Inclinable Power Presses, facilitate working large dies and dies requiring an extra long stroke.

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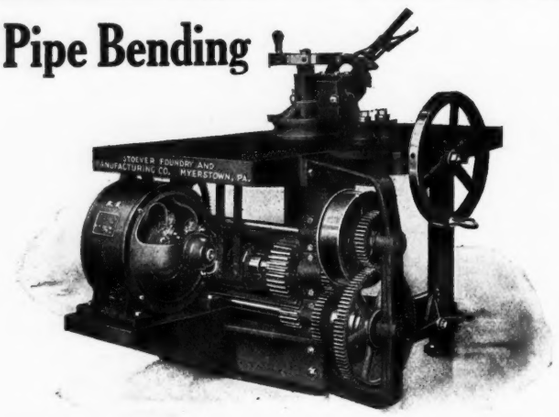
Stoever Machines for Duplicate Pipe Bending



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Speed changes are obtained by lever control. No friction losses when running, no wasted power when the machine is idle.

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Special Circular mailed on request.

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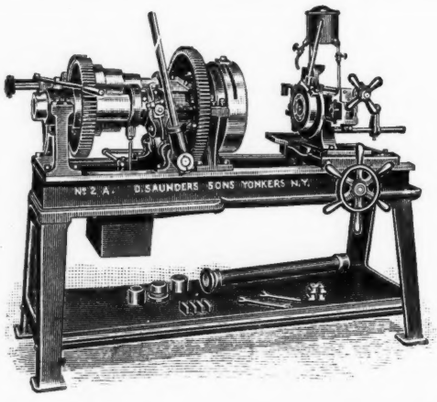

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Pipe is gripped or loosened by the simple movement of a lever without stopping the rotation of chuck. The time this saves is highly appreciated — so is the double-tool cutting-off arrangement, and adjustable expanding die head with interchangeable chasers.

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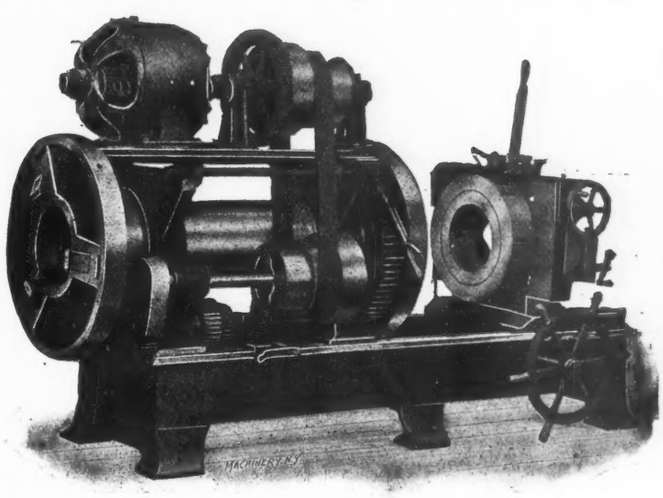
Bignall & Keeler Motor Driven Pipe Machines



Mark the climax of good practice. Motor drive makes the machine a self-contained unit that may be placed in any advantageous position, irrespective of line shafts and other fixtures.

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EXTRA QUALITY

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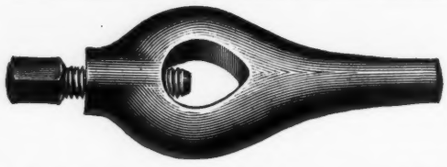

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"ULTRA CAPITAL"

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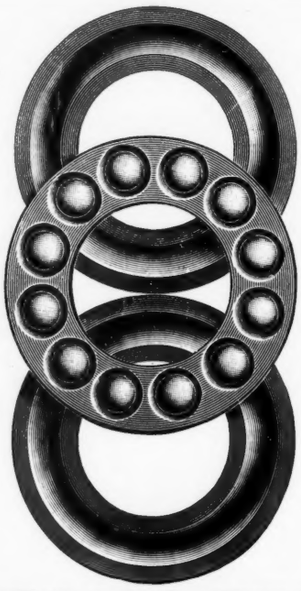

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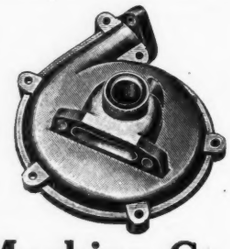

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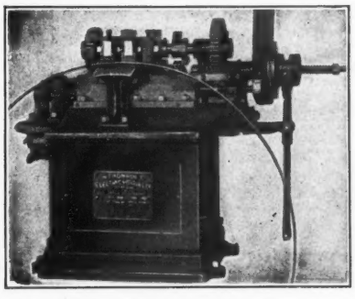

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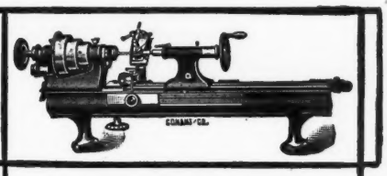

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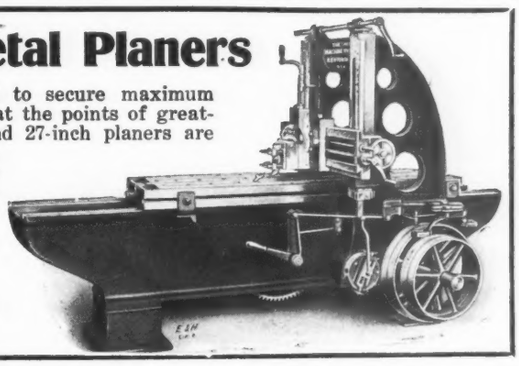

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1—Saunders 6″ Pipe Machine.
1—Curtis 12″ Pipe Machine.
1—17″ Peerless Belt Lacer.
1—1200 lb. Billings & Spencer Friction Board Drop Hammer.

The Motch & Merryweather Machinery Company
707-711 Lakeside Ave., N. W., Cleveland, O. Detroit Branch: 840 Majestic Bldg. Cincinnati Branch: 1014 First Nat'l Bank Bldg. Pittsburgh Branch: 1124 Farmers Bank Bldg.

CONTINUED:—

The list of Tools in this last shop outfit—Many important items at low prices that count.

TRIPLE-GEARED LATHES.
90-in. Swing, 18-ft. bed, heavy, Turret on bed Fitchburg.
70-in. Swing, 21-ft. bed, heavy, Fitchburg.
52-in. Swing, 28-ft. bed, heavy, Newark.
50-in. Swing, 32-ft. bed, heavy, Putnam.
48-in. Swing, 24-ft. bed, blocks 66 in., Fitchburg.
48-in. Swing, 12-ft. bed, heavy, Harrington.
45-in. Swing, 16-ft. bed, cross and angular feeds, New Haven.
42-in. Swing, 22-ft. bed, Putnam.
42-in. Swing, 18-ft. bed, with jaws, Johnson.
34-in. Swing, 8-ft. bed, heavy, Johnson.

BACK-GEARED LATHES.
33-in. Swing, 14-ft. bed, New Haven.
32-in. Swing, 13-ft. bed, Pond.
30-in. Swing, 23-ft. bed, Pond.
30-in. Swing, 17-ft. bed, Pond.
28-in. Swing, 15-ft. bed, Putnam.
26-in. Swing, 12-ft. bed, Blaisdell.
26-in. Swing, 10-ft. bed, Pond.
25-in. Swing, 12-ft. bed, Harrington.
22-in. Swing, 10-ft. bed, Harrington.
16-in. Swing, 8-ft. bed, quick-change, Cincinnati.
SMALL SIZE LATHES—down to 12-in. Swing.

SPIRAL-GEARED PLANERS.
72-in. x 72-in. x 26-ft., 4 heads, Sellers.
36-in. x 36-in. x 11-ft., 2 heads, Sellers.
36-in. x 36-in. x 9-ft., 2 heads, Sellers.
30-in. x 28-in. x 7½-ft., 1 head, Sellers.

SPUR-GEARED PLANERS.
48-in. x 48-in. x 12-ft., 2 heads, Bement-Miles.
42-in. x 42-in. x 14-ft., 1 head, Pond M. T. Co.
37-in. x 37-in. x 26-ft., 2 heads, Niles.
36-in. x 36-in. x 12-ft., 2 heads, Gray.
36-in. x 36-in. x 10-ft., 2 heads, Pond M. T. Co.
36-in. x 36-in. x 8-ft., 2 heads, Pond M. T. Co.
36-in. x 36-in. x 8-ft., 1 head, Pond M. T. Co.
32-in. x 32-in. x 10-ft., 2 heads, Pond M. T. Co.
27-in. x 27-in. x 8-ft., 1 head, Woodward-Powell.
26-in. x 26-in. x 6-ft., 1 head, New Haven.
24-in. x 24-in. x 6-ft., 1 head, Putnam.
PLANERS—SMALL SIZES—down to 16-in.

J. J. McCABE
30 CHURCH STREET, NEW YORK

Worcester Drafting Table

The tops of these tables are white pine drawing boards and can be inclined and clamped at any angle. The adjustment for height is by means of the hand wheel, which is automatically locked at the desired height.

THE WASHBURN SHOPS
of the
Worcester Polytechnic Institute
Worcester, Mass.
Worcester Drill Grinders
Washburn Sensitive Drills
Washburn Speed Lathes
Worcester Drafting Tables

IN STOCK

36″ x 12′ Heavy Duty Slab Miller.
84″ x 84″ x 13′ Sellers Planer, three heads.
84″ x 84″ x 19′ Sellers Planer, two heads.
30″ x 30″ x 8′ Pease Planer.
22″ x 22″ x 6′ Powell Planer, two heads.
26″ x 26″ x 7′ Planer with one head.
Two 48″ Gang Radial Drills.
36″ x 15′ Moore Lathe.
26″ x 16′ Fitchburg Lathe.
24″ x 14′ Rahn-Larmon Lathe.
21″ x 12′ Lodge & Davis Lathe.
22″ x 16′ Draper Lathe.
22″ x 18′ Harrington Lathe.
Two No. 14 Garvin Turret Lathes, 3″ hollow spindle.
Two No. 5 Springfield Oscillating Surface Grinders, planer type.
No. 2 Cincinnati Universal Milling Machine, latest type, with vertical attachment.
No. 13 Pratt & Whitney Single Spindle Profiler.
26″ Gould & Eberhardt Shaper.
24″ back-geared Gould & Eberhardt Shaper.
20″ Smith & Mills Shaper.
20″ x 30″ Pedrick & Ayer Open Side Shaper.
8″ Eaton, Cole & Burnham Pipe Machine.
P. G. 5 Ferracute Punch Press.
No. 5 Bliss Horizontal Reducing Press.
800 lb. Bement Miles & Co., Single Frame Steam Hammer.
11′ Sellers Bending Rolls, 11″ and 13″ rolls.
Complete Boiler Shop Equipment, just purchased, including Lathes, Punches and Shears, Drill Presses, and all the small tools.

New list of tools just issued. Send for latest copy.

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STEEL STAMPS
TRADE MARKS
SPEACIAL DESIGNS
High Grade Steel Letters and Figures
NOBLE & WESTBROOK
'19 Asylum St., HARTFORD, CONN.

The remaining **machines** in a **gas engine shop** will be **sold low.**

LATHE, Triple Geared—
48″ swing, 16 ft. bed.
FLAT AND ROUND TURRET LATHES
PLANERS—27″x 8 ft.—36″x 12 ft., single and double head.
GEAR CUTTERS—CUTTER REAMER and TOOL GRINDER
Modern Tools. "Good as Ever."

36 Rapelyea Street, near Hamilton Avenue
BROOKLYN, N. Y.

Shop Arithmetic for the Machinist—No. 18 in Machinery's Reference Series

Written by a practical machinist and invaluable for purposes of self-education in mathematics, especially as applied to shop problems. 25 Cents—at your News Dealer's or direct from

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SECOND-HAND MACHINERY

Located at Boston, Chicago and New York

LATHES

10″x5′ Champion Comp. Rest.
13″x6′ Pratt & Whitney Rise & Fall Rest.
14″x6′ F. B. Miles Compound Rest.
16″x6′ Speed Lathe.
14″x5′ American Square Arbor.
15″x6′ Shepard Rise & Fall Rest.
16″x6′ Flather Comp. Rest.
14″x6′ Le Blond, Comp. Rest.
18″x6′ Blaisdell Rise and Fall Rest.

19″x6′ D. W. Pond Turret Tool Post.
20″x10′ LeBlond Comp. Rest.
21″x6′ Bridgeport Turret Boring.
21″—48″ Harrington Gap. Boring and Chucking.
21″x8′ Star Turret on Carriage.
21″x8′ P. & W. Plain Swivel Rest.
21″—48″ Harrington Gap Chucking.
22″x10′ F. B. Miles Compound Rest.

22″x16′ Fitchburg Shafting.
24″x14′ Harrington Plain Rest.
32″x12′ Pond Comp. Rest.
42″x22″ Niles Triple Geared.
36″x17′ Pond Triple Geared, Motor Drive.
36″x17′ Pond Triple Geared Belt Drive.
36″x16″ Industrial Works Triple Geared.
42″x17″ Bement & Miles Co.
48″x16″ Bement Dougherty.

TURRET MACHINERY

1/4″ No. 00 Garvin Wire Feed.
3/8″ No. 0 P. & W. Wire Feed.
1/2″ No. 1 P. & W. Wire Feed.
1/2″ No. 1 Garvin Wire Feed.
5/8x4 1/2 Pratt & Whitney, New Model.
2 15/16″ No. 3 Niles Screw Mch.

1 1/8″ Gridley Turret Auto.
24″ Conradson Semi-Auto.
28″ Milwaukee.
¼″ No. 0 Hartford Auto.
⅜″x1″ National Acme 4 Spdle. Auto.
¼″ No. 00 Hartford P. & W. Auto.

24″ Gisholt Turret
5/16″ No. 0 Hartford P. & W. 2 Spdle. Auto.
½″ No. 1 Hartford P. & W. 2 Spdle. Auto.
½″ No. 1 Spencer Single Turret Auto.
21/32″x1½″ No. 2 Brown & Sharpe Auto.

PLANERS AND SHAPERS

10″ F. B. Miles Crank.
12″ W. B. Bement Crank.
15″ Hendey Friction.
18″ B. & D. Crank.
14″x40″ F. B. Miles Trav. Hd. Crank.
18″ Cincinnnati Dble. Hd. Traverse.
24″ Gould & Eberhardt Shaper.
32″ Cincinnati Triple Geared.

17″x17″x4′ Whitcomb Spur Geared.
42″x42″x20′ F. B. Miles, 3 Heads.
48″x48″x20′ Sellers, 3 Heads.
26″x26″x6′ Pond.
26″x23″x16′ Ferris & Miles, 2 Heads.
30″x30″x24′ Sellers, 2 Heads.
22″x22″x6′ Harrington Spur Geared.

32″x32″x12′ Pond, 2 Heads.
32″x32″x14′ Pond, 2 Heads.
36″x36″x20′ Pond, 4 Heads.
40″x40″x26′ Pond, 4 Heads.
86″x86″x30′ Pond, 4 Heads.
86″x86″x35′ Pond, 4 Heads.
78″x72″x24′ Bement & Son, 4 Heads.

DRILLS

13″ No. 1 Sens. Dric. 110 v. d. c. motor.
18″ Niles Stat. Head.
22″ Aurora Sliding Head Drill.
24″ Niles Slid. Head.
24″ Bement Stationary Head.
28″ Pond Slid. Head.
30″ Putnam Sliding Head.
30″ Gould & Eberhardt Slid. Hd.
36″ Gould & Eberhardt Slid. Hd.
48″ Niles Sliding Head.
Prentiss Port. Univ. Rad. Cap. 2″.

2½ Hilles & Jones Semi—Rad.
4′ 6″ Barr Plain Radial.
5′ Niles Semi-Universal.
5′ 6″ Niles No. 1½ Semi-Univ.
6′ 10″ Niles No. 2 Semi-Univ.
6′ 10″ Niles No. 2 Full Univ.
7′ 6″ Niles No. 5 Full Univ.
10″ 2 Spindle Slate Sens.
2 Spindle Sigourney Sens.
12″ 2 Spindle Foote Burt Sens.

14″ 4 Spindle D. P. M.
10″ 3 Spindle Slate Sens.
3 Spindle Sigourney Sens.
17″ 4 Spindle Jones & Lamson Gang.
12″ 4 Spindle Garvin Gang.
14″ 4 Spindle No. 3 Garvin Gang.
14″ 6 Spindle No. 3 Garvin Gang.
6 Spindle Special Langelier.
No. 10 10 Spindle P. & W. Cap. 1 15/16 220 v. d. c. motor.

MILLING MACHINES

No. 2 P. & W. Hand Miller.
No. 1 LeBlond Vert. Mill. Attach.
No. 2 Garvin Plain 31½″x5″x16″.
Smith and Garvin Plain 10″x5″x10″.
No. 2 Garvin Lincoln Miller.

No. 3 Becker Brainard, Univ. 32″x8½″x 20″.
Garvin Sing. Spdle. Profiler Table, 21″x 24″.
72″ Niles Spur Gear Cutter.

No. 5 B. & B. Plain, 9″x3″x7″.
84″ Niles Spur Gear Cutter.
36″ L. W. Pond Gear Cutters.
24″ Gould & Eberhardt Automatic Gear Cutter.

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No. 2 36″ B. & S. Vert. Turret.
Nicholson & Waterman Boring Head 3″ Spindle.
36″ Bullard Boring Mill.

50″ Niles Vertical Boring & Reaming.
Bement & Son Horizontal Spdle. 2⅞″ Spdle.
Kelly Horizontal Spindle, 2″ Spdle.

Bement-Miles Horizontal, 2⅞″ Spdle.
Sterns 96″ Spec. Cyl. Borer.
7′ Pond Boring & Turning Mill.

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No. 1 Bath Universal.
8″x2″ Pedick Dbl. Wet Tool.
14″x2″ Gould & Eberhardt Water Tool.
24″x3′ Pedick Wet Tool.

20″x1½″ Ransom Water Tool.
3″ Sellers Drill Grinder.
Heald Twist Drill Grinder W. T. A.

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Diamond Cupola Polishing Frame.
No. 3 Blount Tool Grinder 12x2.

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Lathe Axle Bement Single.
Lathe Axle No. 2 Bement Dble.
Lathe Axle No. 2 Niles Dble.

Lathe Axle No. 3 Putnam Double.
Lathe Car Wheel 46″ Bement Dble.

42″ Niles Steel Tired Car Wheel Lathe.
36″ Car Wheel Borer.

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6″ Crank Slotter, Bement.
Cotter & Keyseat Drill Mch., Bement.
No. 1 Garvin Horiz. Tapp. Machine.
4″ Espen-Lucas Cold Saw.
Four 2¼x¾ Sq. Pipe Dies.
No. 3 Pipe Tong.
No. 3 Saunders' Sons, Hand Pipe Cutter.
Snap Gauges.
Snap Gauges for Blacksmith.
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No. 4 Robertson Hack Saw.

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2½″ Betts Cut-off Machine.
4½″ Star Cut-off Machine.
Shuster Spiral Spring Winding Mch.
Hartford Rubber Small Vulcanizer.
16″ B. & O. Cold Saw, Cap. 5″ rd.
2″ Blakeslee Bolt Header.
200 H.P. McIntosh-Seymour Hor. Tand. Compound.
350-lb. Single Power Hammer.
16″x3½″ Planer Vise.
10″x2″ Planer Vise Swiv. Base.

1″ Standard Bolt Cutter.
13″x28″ Iron Forge on legs.
No. 8 Q. & S. Circular Shop Saw.
Screw Machine Collets P. & W.—B. & O. —Garvin.
Cutler-Hammer Mfg. Co. 10 H.P. Starting Box.
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Forge with Pan, 28″x13″x8″.
No. 1½ Walworth Mfg. Co.
1100-lb. Single Frame Steam Hammer (Bement).

STEAM ENGINES (NEW)

(1) 10″x10″ Horizontal Single Cylinder C.C. Automatic 28 H.P. at 100 lbs. Steam.

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Located at Boston, Chicago and New York

Hex and Square Nuts to Your Order

2¾" to 4½", U. S. Standard

We not only can furnish a superior line of nuts, but have facilities for forging of all descriptions, from a 4000 lb. steel shaft down to an ordinary gear blank.

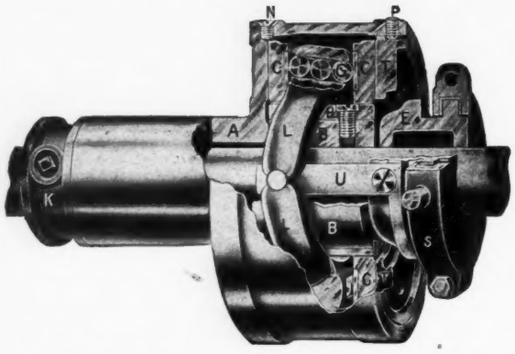
lbs. to 3000 lbs. each. **Open Hearth Steel Die Blocks** from 25 **Weldless Rings,** 24" diameter and smaller.

Write us your needs or give us a call

JOS. DYSON & SONS, Cleveland, Ohio, U. S. A.

"AKRON"

The Safest Clutch for any Speed



Designed on the new "Roller Toggle" principle which, by its very simplicity, insures easy, continuous operation.

Particularly successful on extremely high or very low speed shafts. Action positive and noiseless.

These Clutches require no special pulleys, etc., and will slip automatically if the load exceeds the horse power of the clutch.

Especially adapted for driving machine tools where a high grade clutch equipment is essential.

Other features peculiar to the AKRON in our booklet.

The Williams Foundry & Machine Co.

AKRON, OHIO, U. S. A.

THIS SIDE IS GREEN

GANDY

STITCHED COTTON DUCK BELTING

after September 1st, 1911, will have one edge painted green.

The color of the GANDY BELT has always been a dark red—ever since it was first manufactured 34 years ago.

But in order to reap some benefit from the great reputation of the GANDY, other stitched cotton duck belt manufacturers also painted their belts red, and it is to add some distinctive marking, by which you can absolutely identify the GANDY, that we have established the rule that every GANDY BELT will have ONE EDGE PAINTED GREEN.

Remember—there is only one GANDY BELT, made by the Gandy Belting Company, of Baltimore, Md., the oldest and largest manufacturers of cotton duck belting in the world.

Always be sure to look for the trade mark, a coil of belt and a bale of cotton, also the green edge.

Get GANDY—It is only one-third the cost of leather and 25 per cent cheaper than rubber. The most durable and economical belt for driving, elevating and conveying.

Prove this for yourself. Send for booklet and testimonial letters, which show how successful "The GANDY BELT" is in every line of industry. Also ask for sample.

Write for all this TODAY to

THE GANDY BELTING COMPANY

737 W. Pratt Street BALTIMORE, MD.

New York Office: 88-90 Reade Street

GEARS and GEAR CUTTING

Years of experience as specialists in gear production, coupled with unexcelled facilities and the highest grade of workmanship, enable us to satisfy the most exacting. We are prepared to furnish complete, or cut only,

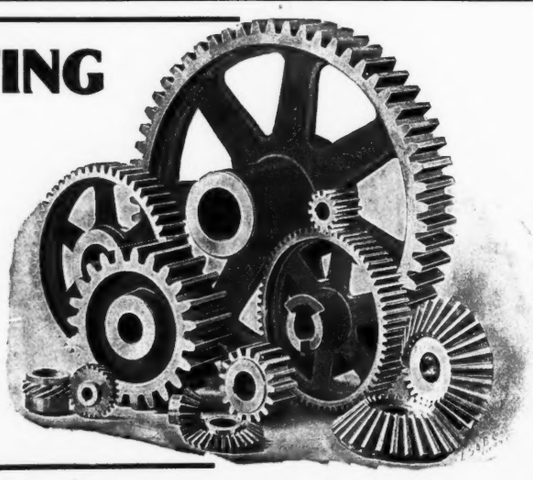
BEVELS, SPURS, SPIRALS, MITRES, WORMS and RACKS.

Send us your specifications when in the market.

GEAR DEPARTMENT

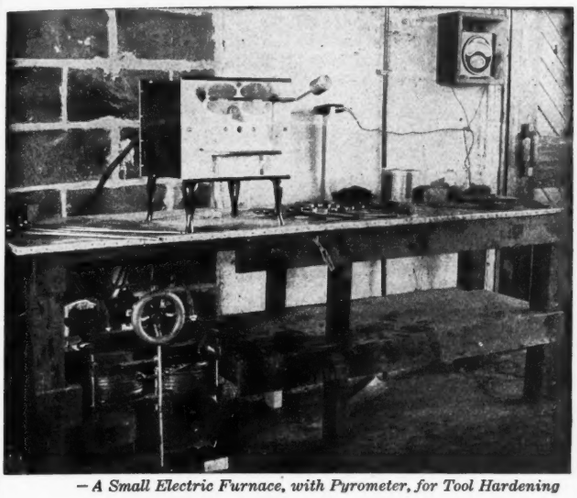
THE VAN DORN & DUTTON CO.

CLEVELAND (Sixth City)



"Electric" Hardening has been the greatest advance of the time in the making of tools

HOSKINS



—A Small Electric Furnace, with Pyrometer, for Tool Hardening

—Right into the practical field its superiority has demonstrated that you can produce better tools by "electric" heat. The reason is fundamental: *the Electric Furnace works without "combustion."* Write for our "Bulletins" *today.*

HOSKINS MANUFACTURING COMPANY

Electric—Furnaces, Pyrometers and Heating Appliances

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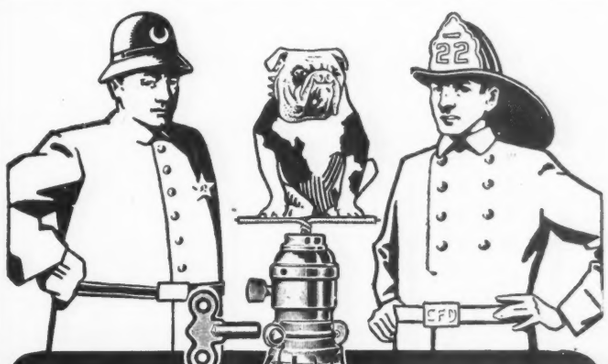

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Protects All Ways and Always

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THEFT BREAKAGE FIRE

A LOXON Costs No More Than a Lamp. Pays For Itself Many Times a Year. Write Us For Full Data and Cost of Installing.

LOXON LAMP GUARD THE KEY TO SAFETY

FREE SAMPLES TO USERS

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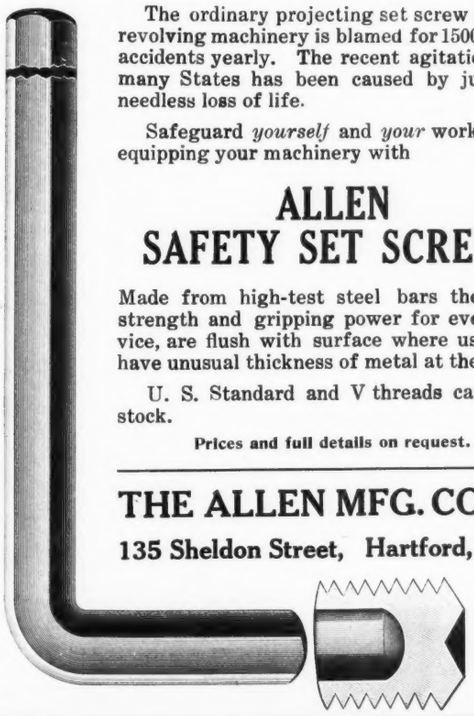
Set Screws Helped to Cause Employer's Liability Agitation



The ordinary projecting set screw used on revolving machinery is blamed for 1500 serious accidents yearly. The recent agitation in so many States has been caused by just such needless loss of life.

Safeguard *yourself* and *your* workmen by equipping your machinery with

ALLEN SAFETY SET SCREWS

Made from high-test steel bars they have strength and gripping power for every service, are flush with surface where used, and have unusual thickness of metal at the point.

U. S. Standard and V threads carried in stock.

Prices and full details on request.

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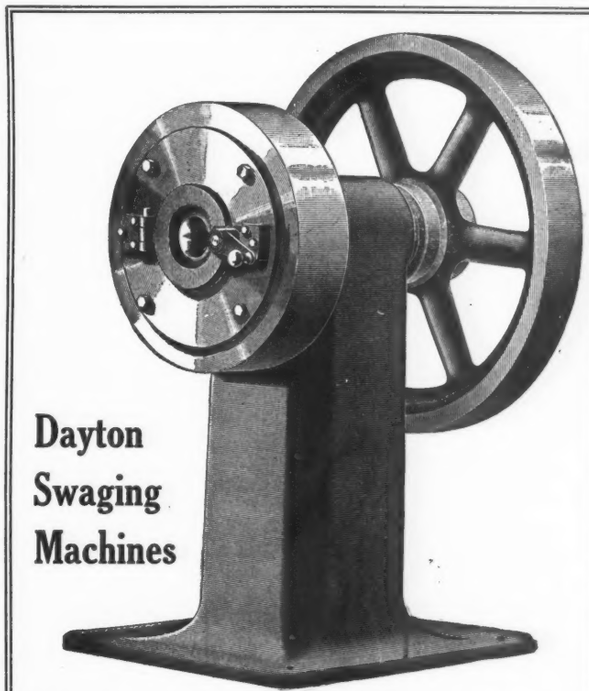


Dayton Swaging Machines

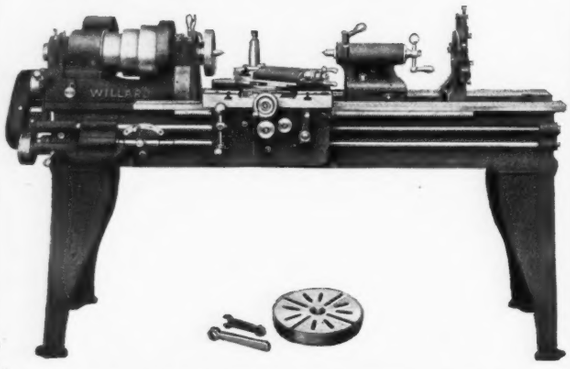
Working metal into shape by swaging prevents the waste incident to all cutting processes and improves the metal under operation. Send for the "Modern Art of Swaging," a free book which tells about this exceptionally rapid and accurate process.

THE EXCELSIOR NEEDLE CO.

TORRINGTON, CONN.

Coventry Swaging Co., Ltd., White Friars Lane, Coventry, England, Agents for Great Britain. Fenwick Freres & Co., 8 Rue de Rocroy, Paris, France, Agents for France, Italy, Belgium, Spain, Portugal and Switzerland.

The Convenience and Accuracy of the Willard 13-inch Lathe are Second to None



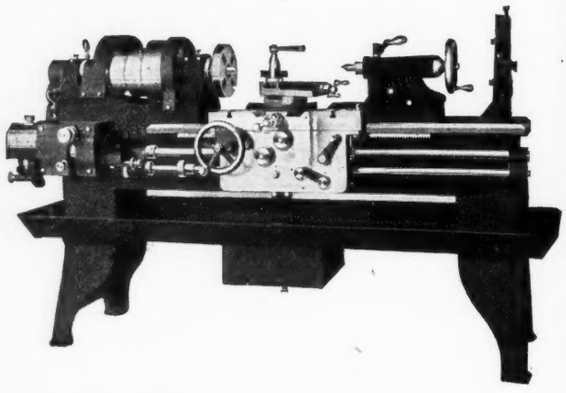
It is adapted for **all** classes of work, designed and built to secure the highest productive efficiency—in quality as well as quantity—and has a working capacity that would tax the ordinary 18-inch lathe to beat.

Ample power, accurate lead screws and feed rods, heavy headstock and strong, stiff apron meet the demands of heavy work and give the best results from high speed steels.

Ask for full description—the Willard will meet your needs.

The Willard Machine and Tool Co.
CINCINNATI, OHIO, U. S. A.

EVERY DETAIL IN CINCINNATI LATHES

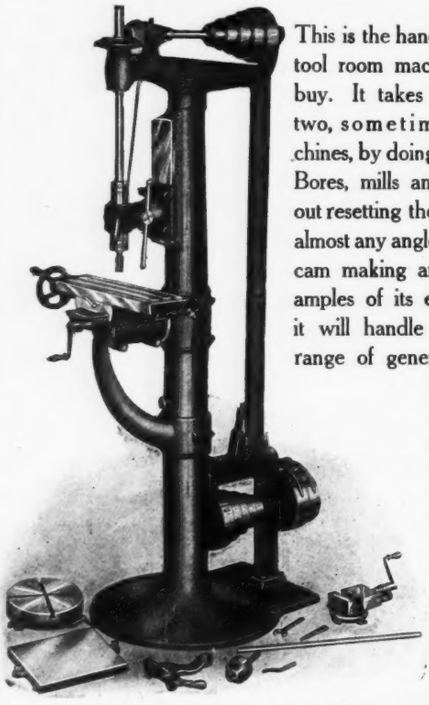


shows their careful workmanship and permanent efficiency. All standard threads cut at once on our **Quick Change Gear Box** without duplicating or removing a gear. Furnish a **double wall apron** that supports both ends of all shafts and studs. You, too, ought to investigate their many advantages before you buy.

The Cincinnati Lathe & Tool Co.
Station B, Cincinnati, Ohio, U. S. A.

There is a saving in every turn of the spindle of the

KNIGHT MILLING AND DRILLING MACHINE No. 1



This is the handiest all-round tool room machine you can buy. It takes the place of two, sometimes three machines, by doing **all** the work. Bores, mills and drills without resetting the piece and at almost any angle. Die, jig and cam making are special examples of its efficiency, and it will handle a very wide range of general work.

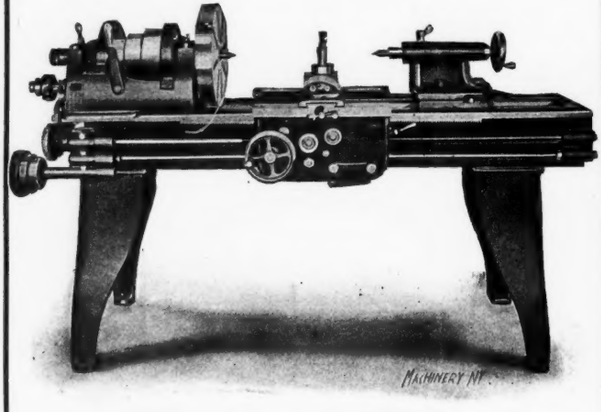
We'll be glad to send circulars showing the machine and some of the many operations performed.

The No. 1½ and No. 2 machines are a little heavier in design but equally efficient.

W. B. KNIGHT MACHINERY CO.
2019-25 Lucas Avenue ST. LOUIS, MO.

A Medium Sized Lathe

With a Full Sized Field of Usefulness



The Monarch 16-inch Engine Lathe

is of new design, strongly built, and provided with all operating conveniences. The heavily ribbed headstock has three-step driving cone, double back gears, and is equipped with quick change feed. The bed is of extra weight and depth and strongly ribbed. Apron and carriage are particularly designed to avoid all danger of uneven motion or springing under heavy cuts. Positive geared feed or belt feed can be instantly obtained, with sufficient changes to cover all requirements.

Glad to send full particulars.

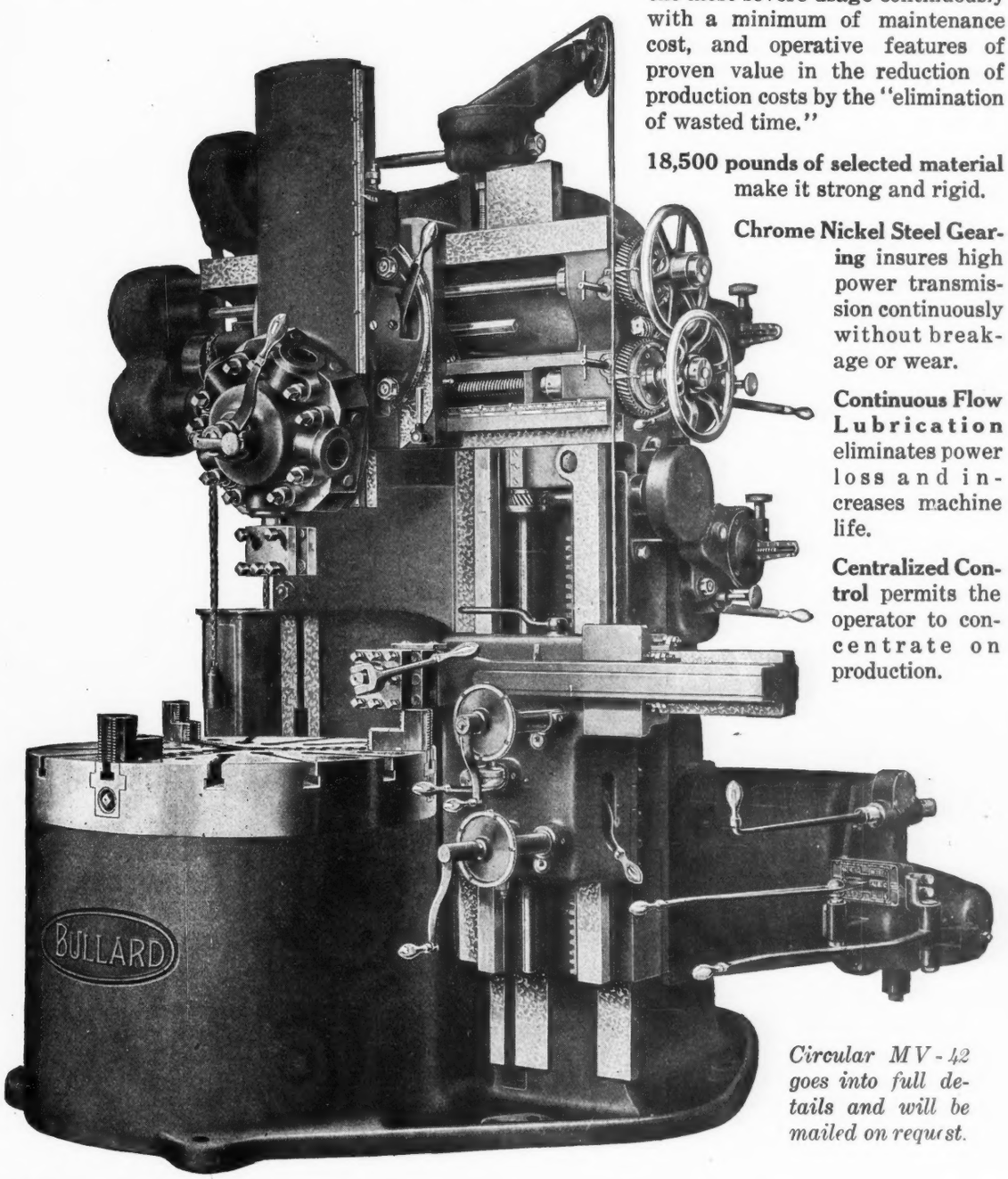
THE MONARCH MACHINE CO.
SIDNEY, OHIO, U. S. A.

The 42-inch Vertical Turret Lathe

MAXI-MILL TYPE

A development of the maximum possibilities of the Vertical Turret Lathe based upon a knowledge of the requirements gained by extensive observation and a specialized experience as makers and users thereof.

A machine tool of extreme power, having weight, rigidity and materials of construction to withstand the most severe usage continuously with a minimum of maintenance cost, and operative features of proven value in the reduction of production costs by the "elimination of wasted time."



18,500 pounds of selected material make it strong and rigid.

Chrome Nickel Steel Gearing insures high power transmission continuously without breakage or wear.

Continuous Flow Lubrication eliminates power loss and increases machine life.

Centralized Control permits the operator to concentrate on production.

Circular MV-42 goes into full details and will be mailed on request.

The Bullard Machine Tool Company

Bridgeport, Conn., U. S. A.

Alphabetical Index of Advertisers

Abrasive Material Co.....110
Acheson Graphite Co., International 204
Acme Machinery Co.....197
Acme Mch. Tool Co.....142
Adams-Bagnall Electric Co..... 84
Adams Co.....159
Ajax Mfg. Co..... 75
Albany Hardware Specialty Mfg. Co. 146
Allen, Edgar, & Co., Ltd.....169
Allen Mfg. Co., Inc.....187
Almond, T. R., Mfg. Co.....167
American Emery Wheel Wks.....109
American File Sharpener Co.....140
American Gas Furnace Co.....131
American Pulley Co.....136
American Specialty Co.....177
American Swiss File & Tool Co..141
American Tool Works Co..... 14
American Vanadium Co..... 39
Ams, Max, Machine Co.....175
Armstrong-Blum Mfg. Co.....178
Armstrong Bros. Tool Co.....116-138
Armstrong Mfg. Co.....180
Athol Mch. Co.....163
Auburn Ball Bearing Co.....140
Aurora Tool Works.....146
Automatic Machine Co.....142

Baird Mch. Co.....174
Baker Bros..... 81
Baldwin Chain & Mfg. Co.....204
Bantam Anti-Friction Co.....182
Barber-Colman Co.....114
Bardons & Oliver..... 38
Barnes, W. F. & J., Co..... 87
Barnes Drill Co., Inc..... 84
Barnett, G. & H., Co.....Back cover
Bath Grinder Co.....100
Baush Mch. Tool Co..... 8
Bay State Grinder Co.....113
Bay State Stamping Co.....172
Beaman & Smith Co.....15-162
Beaudry & Co.....171
Becker Milling Mch. Co..... 49
Bemis & Call H. & T. Co., Inside front cover
Besly, Chas. H., & Co.....104
Best, W. N.....168
Betts Machine Co..... 7
Bickford Mch. Co.....150
Bignall & Keeler Mfg. Co.....181
Bilgram Machine Works.....156
Billings & Spencer Co., 66-Inside front cover
Binsse Mch. Co..... 11
B. L. Company.....126
Blanchard Machine Co.....108-206
Bliss, E. W., Co.....175
Boker, Hermann, & Co.....119
Boston Gear Works.....157
Bradford Mch. Tool Co..... 9
Bradley, C. C., & Son.....170
Bretz, J. S., Co..... 54
Bristol Co.....Back cover
Brown, H. B., Co.....176
Brown Hoisting Mchy. Co.....138
Brown Instrument Co.....137
Brown & Sharpe Mfg. Co..... 67
Brubaker, W. L., & Bros.....168
Bryant Chucking Grinder Co.....109
Buffalo Forge Co.....130
Buffalo Fdry. & Mch. Co.....171
Builders Iron Foundry....Back cover
Bullard Mch. Tool Co.....189
Burr, J. T., & Sons.....176
Butler, A. G.....204
Butterfield & Co.....206

Calder, Geo. H.....111
Caldwell, H. W., & Son Co.....169
Cammell Laird & Co.....155
Carborundum Co.....106
Card, S. W., Mfg. Co..... 55
Carpenter, J. M., Tap & Die Co. 140-Back cover
Carpenter-Tew Gear Co.....155
Carter & Hakes Co.....146
Chambersburg Engr. Co.....174
Champion Tool Works Co..... 21
Chicago Flexible Shaft Co.....97-128
Chicago Mch. Tool Co..... 45
Chicago Rawhide Mfg. Co., Back cover
Cincinnati Ball Crank Co.....182
Cincinnati Bickford Tool Co..... 26
Cincinnati Gear Cutting Mch. Co. 20
Cincinnati Lathe & Tool Co.....188
Cincinnati Milling Mch. Co..... 69
Cincinnati Planer Co..... 19
Cincinnati Pulley Mchy. Co..... 63
Cincinnati Shaper Co..... 20
Cleveland Automatic Mch. Co.... 58
Cleveland Mch. Tool Works.....123
Cleveland Planer Works..... 97
Cleveland Twist Drill Co.....31-66
Cling-Surface Co.....193
Coates Clipper Mfg. Co..... 86
Coes Wrench Co.....66-132
Colburn Mch. Tool Co.....148
Columbia Steel Co.....182
Columbus Die, Tool & Mch. Co... 82
Cook, Asa S., Co.....163
Crescent Machine Co.....170
Crocker-Wheeler Co.....135
Cullman Wheel Co.....156
Curtis & Co. Mfg. Co.....177
Curtis & Curtis Co.....180
Cushman Chuck Co.....164

Dallet, Thos. H., Co.....170
Dart, E. M., Mfg. Co.....168
Davenport Mch. Tool Co.....144
Davis, W. P., Mch. Co..... 23
Davis, Rodney.....157
Davis-Bournonville Co.....151
Delphos Mfg. Co.....177
Delta File Works.....Back cover
Desmond-Stephan Mfg. Co.....110
Detrick & Harvey Mch. Co..... 92
Detroit Hoist & Mch. Co.....138
Detroit Twist Drill Co..... 40
Diamond Chain & Mfg. Co..... 89
Diamond Mch. Co.....105
Diamond Saw & Stamping Wks...195
Dienelt & Eisenhardt, Inc.....171
Dill, T. C., Mch. Co.....122
Dixon, Jos., Crucible Co.....130
Dodge Mfg. Co..... 35
Doehler Die-Casting Co.....155
Dreses Mch. Tool Co..... 56
Dudgeon, Richard.....131
Durbrow & Hearne Mfg. Co.....163
Dyson, Jos., & Sons.....186

Earle Gear & Mch. Co.....156
Eck Dynamo & Motor Co.....137
Electric Welding Products Co....124
Elgin Tool Works.....163
Erie Foundry Co.....170
Errington, F. A.....165
Espen-Lucas Mch. Works.....173
Evans, G. F.....173
Excelsior Needle Co.....187

Fawcus Machine Co.....155
Fay & Scott..... 46
Fellows Gear Shaper Co..... 50
Ferracute Machine Co.....175
Firth-Sterling Steel Co.....118
Fitchburg Mch. Works.....150
Flather & Co..... 90
Flather, E. J., Mfg. Co.....158
Foos Gas Engine Co.....168
Foote Bros. Gear & Mch. Co.....158
Foreign Machinery Merchants.... 12
Fort Wayne Electric Works.....113
Fosdick Mch. Tool Co.....149
Fox Machine Co..... 63
Franklin Mfg. Co.....156
Franklin Portable Crane & Hoist Co. 139
Frasse, Peter A., & Co.....154
Fritz Mfg. Co.....168
Frontier Iron Works.....147
Frost Gear & Mch. Co.....157

Gandy Belting Co.....186
Gang, Wm. E., Co.....112
Ganschow, Wm., Co.....157
Gardner Mch. Co..... 76
Garvin Mch. Co.....120
General Electric Co.....133
Geometric Tool Co.....111
Gerstner, H., & Sons.....152
Gisholt Mch. Co..... 93
Gleason Works, Front cover-Back cover
Globe Mch. & Stamping Co.....204
Goldschmidt Thermit Co.....201
Gorton, George, Mch. Co.....176
Gould & Eberhardt..... 42
Graham Mfg. Co.....127
Grant Gear Works.....157
Grant Mfg. & Mch. Co..... 66
Gray, G. A., Co..... 32
Greaves, Klusman & Co..... 85
Greene, Tweed & Co.....130
Greenfield Mch. Co..... 98

Hamilton Mch. Tool Co..... 34
Hammacher, Schlemmer & Co.... 73
Hardinge Bros., Inc.....203
Harrington, Edwin, Son & Co.....139
Hart Mfg. Co.....197
Hawkridge Bros. Co.....154
Hay-Budden Mfg. Co.....206
Hayes File Co.....163
Heald Machine Co.....107
Heller Bros. Co.....182
Hendey Mch. Co..... 13
Henley, Norman W., & Son.....197
Henry & Wright Mfg. Co..... 79
Hess-Bright Mfg. Co..... 43
Hill, Clarke & Co..... 45
Hoefer Mfg. Co..... 27
Hoffman, Geo. W.....178
Hoggson & Pettis Mfg. Co.....162
Horsburgh & Scott Co.....158
Horton, E., & Son Co.....169
Horton, S. E., Mch. Co.....163
Hoskins Mfg. Co.....187
Howson & Howson.....111
Hoysradt & Case.....111
Hurlbut-Rogers Mch. Co.....178
Huther Bros. Saw Mfg. Co.....171
Hyatt Roller Bearing Co..... 48

Industrial Instrument Co.....204
Ingersoll Milling Mch. Co..... 22
Ingersoll-Rand Co.....115
International Correspondence Schools 95
International Mch. Tool Co..... 46
International Oxygen Co.....128

Jacobs Mfg. Co.....165
Jessop, Wm., & Sons, Inc.....197
Johns-Manville, H. W., Co.....129
Johnson, Carlyle, Mch. Co.....148
Jones & Lamson Mch. Co.....16-17

Kearney & Trecker Co..... 10
Kelly, R. A., Co.....122
Kelly Reamer Co.....125
Kempsmith Mfg. Co..... 30
Kendall, W. F.....157
Kern Machine Tool Co..... 63
Keuffel & Esser Co.....126
Knecht Planer Co..... 32
Knight, W. B., Mchy. Co.....188
Kolesch & Co.....165

Landis Machine Co., Inc..... 37
Landis Tool Co.....101
Lapointe Mch. Tool Co..... 97
Lea Equipment Co.....170
LeBlond, R. K., Mch. Tool Co.191-199
LeCount, Wm. G.....182
Lees-Bradner Co..... 36
Lincoln-Williams Twist Drill Co..140
Lodge & Shipley Mch. Tool Co.... 6
Loew Mfg. Co.....176
Long & Allstatter Co.....179
Lovejoy Co.....155
Lucas Mch. Tool Co..... 71
Lufkin Rule Co.....195
Lumen Bearing Co.....182
Lutter & Gies Co..... 84

Macdonald & Macdonald.....111
Machinery Forging Co.....154
Manning, Maxwell & Moore, Inc..100
Maris Bros.....138
Mason, Volney W., & Co.....138
Massachusetts Saw Works.....173
Massillon Fdry. & Mch. Co.....174
McCabe, J. J.....24-184
McCabe Mch. Co.....184
McCullough-Dalzell Crucible Co...171
McGill Mfg. Co.....187
Mechanical Appliance Co.....112
Mechanics Mch. Co.....147
Meisselbach-Catucci Mfg. Co.....157
Merrell Mfg. Co.....179
Merrill Bros.....168
Michigan Press Co.....178
Milled Screw & Mch. Co.....150
Millers Falls Co.....170
Milwaukee Fdry. Supply Co.....177
Milwaukee Mch. Tool Co.....183
Miner & Peck Mfg. Co...Back cover
Mitts & Merrill..... 28
Modern Tool Co.....108
Moline Tool Co.....112
Monarch Mfg. Co.....188
Montgomery & Co.....Back cover
Morris, J. B., Mch. Tool Co.....176
Morrow Mfg. Co.....164
Morse Chain Co..... 89
Morse Twist Drill & Mch. Co..... 60
Morton Mfg. Co.....122
Motch & Merryweather Mchy. Co.184
Mueller Mch. Tool Co.....195
Mumford Molding Mch. Co.....182

National-Acme Mfg. Co.....205
National Machinery Co..... 59
National Tool Co.....164
National Tube Co.....117
National Twist Drill & Tool Co.. 81
Newark Gear Cutting Mch. Co...159
New Britain Mch. Co..... 82
New England Annealing & Tool Co. 154
New England Gear Works.....157
Newport Gear & Mch. Works.....157
New Process Raw Hide Co...160-161
Newton Mch. Tool Works, Inc.... 57
New York Belting & Packing Co.. 94
Nicholson, W. H., & Co.....169
Nicholson File Co..... 25
Niles-Bement-Pond Co.....4-5-65-185
Noble & Westbrook.....184
Northern Engineering Works.....136
Norton Co.....103
Norton Grinding Co.....102
Nuttall, R. D., Co.....158

Obermayer, S., Co.....182
Oesterlein Mch. Co..... 18
Ohio Mch. Tool Co.....183
Ohio-National Mfg. Co..... 85
O. K. Tool Holder Co.....177
Oliver, W. W., Mfg. Co.....150
Olney & Warrin.....168
Oneida National Chuck Co.....163
Osgood, J. L.....177
Owen Mch. Tool Co..... 83

Page-Storms Drop Forge Co., Inside front cover
Parker, C. L.....111
Parker White Metal & Mch. Co..182
Pawling & Harnischfeger Co.....139
Peerless Automatic Mch. Co.....150
Peerless Rubber Mfg. Co..... 94
Philadelphia Gear Works, Inc....156
Philips Pressed Steel Pulley Wks.129
Phosphor Bronze Smelting Co.....206
Poole Eng'r'g. & Mch. Co.....156
Potter & Johnston Mch. Co..... 33
Pratt Chuck Co.....165
Pratt & Whitney Co..... 64
Prentice Bros. Co..Inside back cover
Prentiss Tool & Supply Co..... 52
Prentiss Vise Co.....168
Pressed Steel Mfg. Co.....111

Quint, A. E.....201

Ransom Mfg. Co..... 99
Ready Tool Co.....183
Reece, E. F., Co.....183
Reed, F. E., Co.....121
Reed, Francis, Co.....111
Reed Mfg. Co.....126
Reichhelm, E. P., & Co.....141
Reliance Elec. & Eng. Co.....134
Reynolds Mchy. Co.....159
Rhoads, J. E., & Sons.....195
Richards, I. P., Co.....176
Rivett Lathe Mfg. Co.....206
Robbins Mch. Co.....150
Rochester Boring Mch. Co..... 83
Rockford Drilling Mch. Co.....145
Rockford Milling Mch. Co..... 83
Rockford Tool Co.....80-171
Rockwell, W. S., Co.....168
Rockwell Furnace Co.....129
Rogers, J. M., Works, Inc.....169
Root, C. J., Co.....171
Roth Bros. & Co.....137
Rowbottom Mch. Co.....113
Royersford Fdry. & Mch. Co..128-176

Safety Emery Wheel Co..... 98
Saginaw Mfg. Co.....173
Saunders', D., Sons.....180
Sawyer Tool Mfg. Co.....126
Schellenbach-Hunt Tool Co.....165
Schneider & Goosmann Mch. Co..183
Schuchardt & Schutte.....160
Schumacher & Boye..... 18
Schwerdtle Stamp Co.....157
Second Hand Machinery.....184
Sellers, Wm., & Co., Inc..... 92
Seneca Falls Mfg. Co.....144
Shepard Elec. Crane & Hoist Co..139
Shore Instrument & Mfg. Co.....162
Sibley Mch. Tool Co..... 78
Simonds Mfg. Co.....201
Skinner Chuck Co.....166
Slocomb, J. T., Co.....152
Smart, A. J., Mfg. Co....Back cover
Smith & Mills Co.....111
Snyder, J. E., & Son..... 3
Spacke, F. W., Mch. Co.....177
Sprague Electric Works...134-138-193
Springfield Machine Tool Co..... 53
Standard Engineering Co.....178
Standard Gauge Steel Co.....155
Standard Mchy. Co.....166
Standard Tool Co..... 51
Standard Welding Co..... 96
Stark Tool Co.....183
Starrett, L. S., Co.....153
Steiner, E. E.....172
Steinle Turret Mch. Co.....123
Stephan, C. H., Mfg. Co.....111
Sterling Emery Wheel Mfg. Co...110
Stewart Heater Co.....172
Stockbridge Machine Co..... 30
Stoever Fdry. & Mfg. Co.....180
Story, H. T.....173
Stow Flexible Shaft Co.....136
Stow Mfg. Co.....172
Sturtevant, B. F., Co.....193
Superior Mch. Tool Co..... 79
Swaine, Fred J., Mfg. Co.....179
Syracuse Twist Drill Co.....172

Tabor Mfg. Co..... 91
Taft-Peirce Mfg. Co..... 80
Taylor & Fenn Co.....147
Terrell's Equipment Co.....152
Thomson Electric Welding Co....183
Toledo Bridge & Crane Co.....136
Toledo Electric Welder Co..... 77
Toledo Mch. & Tool Co.....178
Toomey, Frank, Inc.....184
Trimont Mfg. Co.....181
Trump Bros. Mch. Co.....162
Tucker, W. M. & C. F.....206

Underwood, H. B., & Co.....130
Union Mfg. Co.....164
Union Twist Drill Co..... 29
U. S. Electrical Tool Co..... 62
Universal Mch. Screw Co.....149

Valley City Mch. Wks.....110
Vandyck Churchill Co.....175
Van Dorn & Dutton Co.....82-186
Veeder Mfg. Co.....173
Vitrified Wheel Co.....112
Von Wyck Mch. Tool Co..... 37

Walker, O. S., & Co.....Back cover
Waltham Mch. Works..... 82
Waltham Watch Tool Co.....146
Walton Co.....177
Walworth Mfg. Co..... 3
Ward, Edgar T., & Sons.....182
Warner & Swasey Co..... 61
Washburn Shops.....184
Waterbury Farrel F. & M. Co..... 66
Watson-Stillman Co.....174
Wells, F. E., & Son Co..... 99
Wells Bros. Co..... 41
Wentworth Institute.....183
Westcott Chuck Co.....162
Western Tool & Mfg. Co.....141
West Haven Mfg. Co.....203
Westinghouse Elec. & Mfg. Co...134
Whitman & Barnes Mfg. Co..... 44
Whitney Mfg. Co..... 88
Whiton, D. E., Mch. Co..... 90
Whittlesey, Geo. P.....111
Wiley & Russell Mfg. Co.....127
Willard Mch. & Tool Co.....188
Williams, J. H., & Co..... 97
Williams Fdry. & Mch. Co.....186
Williams, White & Co.....179
Wilmarth & Morman Co.....113
Wilson, W. A., Machine Co..... 66
Windsor Mch. Co.....143
Winfield Electric Welding Mch. Co. 47
Wood's, T. B., Sons Co.....203
Woodward & Powell Planer Co..... 3
Wyman & Gordon Co.....172

Yale & Towne Mfg. Co.....137

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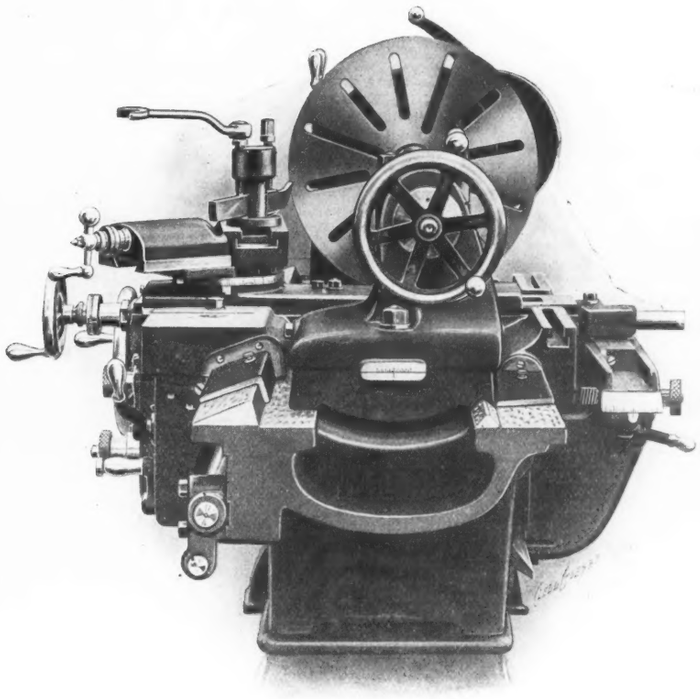

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Machinery's Product Index

Abrasive Materials
Abrasive Material Co.....110
American Emery Wheel Wks.109
Carborundum Co. 106
Norton Co. 103
Safety Emery Wheel Co..... 98
Vitrified Wheel Co.....112

Accumulators, Hydraulic
Niles-Bement-Pond Co..4-5-65-185
Waterbury Farrel Fdry. & Mch. Co. 66
Watson-Stillman Co. 174

Air Lifts
Ingersoll-Rand Co. 115

Alloys
American Vanadium Co..... 39

Alundum
See Grinding Wheels.

Arbor Presses
Fox Machine Co..... 63
Lucas Mch. Tool Co..... 71
Seneca Falls Mfg. Co.....144

Arbors
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Morse Twist Drill & Mch. Co. 60
Pratt Chuck Co.....165
Pratt & Whitney Co..... 64
Skinner Chuck Co.....166
Union Mfg. Co.....164
Union Twist Drill Co..... 29
Wilmarth & Morman Co.....113

Asbestos Products
Johns-Manville Co., H. W.....129

Balancing Tools
Rockford Tool Co.....80-171

Balls, Brass
Pressed Steel Mfg. Co.....111

Balls, Steel
Boker & Co., Hermann.....119
Pressed Steel Mfg. Co.....111

Bars, Boring
Beaman & Smith Co.....15-162
Cleveland Twist Drill Co...31-66
Niles-Bement-Pond Co..4-5-65-185
Underwood & Co., H. B.....130

Bearings, Ball and Roller
Auburn Ball Bearing Co.....140
Bantam Anti-Friction Co.....182
B. L. Company.....126
Boston Gear Works.....157
Bretz Co., J. S..... 54
Hess-Bright Mfg. Co..... 43
Hyatt Roller Bearing Co..... 48
Pressed Steel Mfg. Co.....111
Royersford Fdry. & Mch. Co.. 128-176

Belt Bench
Tabor Mfg. Co. 91

Belt Clamps
Hoggson & Pettis Co.....162

Belt Dressing
Cling-Surface Co. 193

Belt Fasteners
Bristol Co. .....Back cover
Greene, Tweed & Co.....130

Belt Filler
Cling-Surface Co. 193

Belt Lacing, Metal
Bristol Co. .....Back cover

Belting, Cotton
Gandy Belting Co.....186

Belting, Leather
Rhoads & Sons, J. E.....195

Belting, Rubber
New York Belting & Packing Co. 94

Bending Machinery, Hydraulic
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Bending Machines, Pipe
Stoever Fdry. & Mfg. Co....180

Bending Machines, Plate
Long & Allstatter Co.....179
Sellers & Co., Inc., Wm..... 92

Bending Machines, Power
National Mchy. Co..... 59
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Bending Tools
Underwood & Co., H. B.....130

Blanks, Nut and Screw
Electric Welding Products Co.124

Blocks, Chain
See Hoists, Hand.

Blocks, Die
Nicholson & Co., W. H.....169

Blowers
American Gas Furnace Co....131
Buffalo Forge Co.....130
Chicago Flexible Shaft Co..97-128
General Electric Co.....133
Hoysradt & Case.....111
Roth Bros. & Co.....137
Sturtevant Co., B. F.....193
Westinghouse Elec. & Mfg. Co. 134

Blue Print Machines
Keuffel & Esser Co.....126

Blue Print Paper
Keuffel & Esser Co.....126

Boiler Tubes
National Tube Co.....117

Bolt and Nut Machinery
Acme Mchy. Co.....197
Ajax Mfg. Co..... 75
Brown Co., H. B.....176
Davis Machine Co., W. P.... 23
Detrick & Harvey Mch. Co... 92
Harrington, Son & Co., Edwin 139
Landis Machine Co., Inc..... 37
National-Acme Mfg. Co.....205
National Machinery Co..... 59
Newton Mch. Tool Wks., Inc.. 57
Prentiss Tool and Supply Co.. 52
Sellers & Co., Inc., Wm..... 92
Standard Engineering Co.....178
Waterbury Farrel Fdry. & Mch. Co. 66
Wells Bros. Co. 41
Wiley & Russell Mfg. Co.....127

Bolt Pointing Machines
Acme Mchy. Co.....197
Brown Co., H. B.....176
Landis Mch. Co., Inc..... 37
National Mchy. Co..... 59

Bolts and Nuts
Electric Welding Products Co. 124
National-Acme Mfg. Co.....205

Books, Technical
Henley & Son, Norman W....197

Boosters
Roth Bros. & Co.....137
Westinghouse Elec. & Mfg. Co. 134

Boring and Drilling Machines, Horizontal
Barnes Co., W. F. & John... 87
Beaman & Smith Co.....15-162
Betts Mch. Co..... 7
Binsse Mch. Co..... 11
Cleveland Mch. Tool Works..123
Detrick & Harvey Mch. Co... 92
Fitchburg Machine Works...150
Fosdick Mch. Tool Co.....149
Gisholt Mch. Co..... 93
Hill, Clarke & Co..... 45
Hoefer Mfg. Co..... 27
Lucas Mch. Tool Co..... 71
Manning, Maxwell & Moore, Inc. 100
McCabe, J. J.....24-184
Motch & Merryweather Machinery Co. 184
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Pawling & Harnischfeger Co..139
Prentiss Tool & Supply Co.... 52
Rochester Boring Mch. Co.... 83
Rockford Drilling Mch. Co...145
Sellers & Co., Inc., Wm..... 92
Vandyck Churchill Co.....175

Boring Tools
Armstrong Bros. Tool Co..116-138
Cleveland Twist Drill Co..31-66
Western Tool & Mfg. Co.....141

Boring and Turning Mills, Vertical
American Tool Works Co..... 14
Baker Bros. 81
Betts Mch. Co..... 7
Bullard Mch. Tool Co.....189
Colburn Mch. Tool Co.....148
Flather Mfg. Co., E. J.....158
Gisholt Mch. Co..... 93
Harrington, Son & Co., Edwin 139
Mitts & Merrill 28
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Springfield Mch. Tool Co..... 53

Broaching Machines
Harrington, Son & Co., Edwin 139
Hill, Clarke & Co..... 45
Lapointe Mch. Tool Co..... 97
Pratt & Whitney Co..... 64

Broken Tap Remover
Walton Co. 177

Bronze Bearings
Lumen Bearing Co.....182

Buffers
Fort Wayne Electric Works..113
Mechanical Appliance Co.....112
Valley City Mch. Works....110

Bulldozers
Ajax Mfg. Co..... 75
Bliss Co., E. W.....175
National Mchy. Co..... 59
Williams, White & Co.....179

Burners, Oil or Gas
Best, W. N.....168
Rockwell Furnace Co.....129

Bushings
National Tube Co.....117
Walworth Mfg. Co..... 3

Cabinets, Blue Print
Fritz Mfg. Co. 168

Cabinets, Tool
Armstrong Bros. Tool Co.116-138
Hammacher, Schlemmer & Co. 73
Morse Twist Drill & Mch. Co. 60

Calipers
Brown & Sharpe Mfg. Co.... 67
Slocomb Co., J. T.....152
Starrett Co., L. S.....153

Cams
Bilgram Machine Works.....156
Boston Gear Works.....157

Carbonizing
American Gas Furnace Co....131

Carborundum
See Grinding Wheels.

Case-Hardening
American Gas Furnace Co....131
Best, W. N. 168
Chicago Flexible Shaft Co..97-128
New England Annealing & Tool Co. 154
Rockwell Furnace Co.....129
Williams & Co., J. H..... 97

Castings
Athol Mch. Co.....163
Brown & Sharpe Mfg. Co..... 67
Lumen Bearing Co. 182
Parker White Metal & Mch. Co. 182
Phosphor Bronze Smelting Co.206
Union Mfg. Co.....164

Castings, Die Molded
Doehler Die-Casting Co.....155
Franklin Mfg. Co.....156
Veeder Mfg. Co.....173

Castings, Vanadium
American Vanadium Co..... 39

Cement, Iron
Obermayer Co., S.....182

Center Grinders
Heald Mch. Co.....107
Mueller Mch. Tool Co.....195
Trump Bros. Mch. Co.....162

Centering Machines
Hendey Mch. Co..... 13
Niles-Bement-Pond Co..4-5-65-185
Pratt & Whitney Co..... 64
Springfield Mch. Tool Co..... 53
Wells & Son Co., F. E..... 99
Whiton Mch. Co., D. E..... 90

Centers, Milling
Bickford Mch. Co.....150

Centers, Planer
Cincinnati Planer Co..... 19
Fay & Scott 46
Morse Twist Drill & Mch. Co. 60
Reed Co., F. E.....121
Woodward & Powell Planer Co. 3

Chain Blocks, Differential, Duplex and Triplex
Yale & Towne Mfg. Co.....137

Chain Machinery
Baird Mch. Co.....174

Chains
Baldwin Chain & Mfg. Co.....204
Diamond Chain & Mfg. Co.... 89
Whitney Mfg. Co..... 88

Chains, Driving
Boston Gear Works.....157
Diamond Chain & Mfg. Co.... 89
Morse Chain Co..... 89
Whitney Mfg. Co..... 88

Chucking Machines
Acme Machine Tool Co.....142
American Tool Wks. Co..... 14
Brown & Sharpe Mfg. Co.... 67
Cleveland Auto. Mch. Co.... 58
Davis Mch. Co., W. P..... 23
Garvin Machine Co.....120
Gisholt Mch. Co..... 93
LeBlond Mch. Tool Co., R. K.. 191-199
Potter & Johnston Mch. Co... 33
Pratt & Whitney Co..... 64
Reed Co., F. E.....121
Springfield Mch. Tool Co..... 53
Warner & Swasey Co..... 61
Windsor Mch. Co.....143

Chucks, Drill
Almond Mfg. Co., T. R.....167
Cleveland Twist Drill Co...31-66
Cushman Chuck Co.....164
Detroit Twist Drill Co..... 40
Horton & Son Co., E.....162
Jacobs Mfg. Co.....165
Millers Falls Co.....170
Modern Tool Co.....108
Montgomery & Co.....Back-cover
Morrow Mfg. Co.....164
Morse Twist Drill & Mch. Co. 60
Oneida National Chuck Co...163
Pratt Chuck Co.....165
Skinner Chuck Co.....166
Standard Mchy. Co.....166
Standard Tool Co..... 51
Union Mfg. Co. 164
Wells Bros. Co..... 41
Westcott Chuck Co.....162
Whitman & Barnes Mfg. Co.. 44
Whitney Mfg. Co..... 88
Whiton Mch. Co., D. E..... 90
Wiley & Russell Mfg. Co.....127

Chucks, Lathe
Cushman Chuck Co.....164
Gisholt Mch. Co..... 93
Hoggson & Pettis Mfg. Co....162
Horton & Son Co., E.....162
Horton Machine Co., S. E.....163
Montgomery & Co.....Back cover
Pratt Chuck Co.....165
Pratt & Whitney Co..... 64
Skinner Chuck Co.....166
Union Mfg. Co.....164
Whiton Mch. Co., D. E..... 90

Chucks, Magnetic
Walker & Co., O. S....Back cover

Chucks, Planer
Cincinnati Planer Co..... 19
Harrington, Son & Co., Edwin 139
Skinner Chuck Co.....166
Union Mfg. Co.....164

Chucks, Split
Hardinge Bros., Inc.....203
Rivett Lathe Mfg. Co.....206
Stark Tool Co.....183

Chucks, Tapping
Errington, F. A.....165

Circuit Breakers
General Electric Co.....133
Westinghouse Elec. & Mfg. Co. 134

Clamps
Brown & Sharpe Mfg. Co..... 67
Hammacher, Schlemmer & Co. 73
Hoggson & Pettis Mfg. Co...162
Starrett Co., L. S.....153
Williams & Co., J. H..... 97

Clocks, Watchmen's
Hardinge Bros., Inc.....203

Clutches, Friction
Caldwell & Son Co., H. W...169
Dodge Mfg. Co..... 35
Evans, G. F.....173
Johnson Mch. Co., Carlyle...148
Oesterlein Mch. Co..... 18
Williams Fdry. & Mch. Co....186
Wood's Sons Co., T. B.....203

Cold Saw Cutting-off Machines
Billings & Spencer Co., 66-Inside front cover
Burr & Sons, John T.....176
Espen-Lucas Mch. Works....173
Mumford Molding Mch. Co...182

Compressors, Air
Curtis & Co. Mfg. Co.....177
Dallett Co., Thos. H.....170
Ingersoll-Rand Co.....115
Spacke Mch. Co., F. W.....177

Compressors, Gas
Ingersoll-Rand Co. 115

Conduit, Interior
Sprague Elec. Wks...134-138-193

Cones, Friction
Evans, G. F.....173

Connecting Rods and Straps
Electric Welding Products Co.124

Contract Work
Blanchard Machine Co...108-206
Morrow Mfg. Co.....164
Owen Machine Tool Co..... 83
Taft-Peirce Mfg. Co..... 80
Thomson Electric Welding Co.183

Controllers
Crocker-Wheeler Co. 135
Eck Dynamo & Motor Co.....137
General Electric Co.....133
Reliance Elec. & Eng. Co.....134
Roth Bros. & Co.....137
Sprague Elec. Wks...134-138-193

Corundum
See Grinding Wheels.

Cotters
Cleveland Twist Drill Co...31-66
Morse Twist Drill & Mch. Co. 60
Standard Tool Co..... 51
Union Twist Drill Co..... 29
Whitman & Barnes Mfg. Co... 44

Counterbores
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Morse Twist Drill & Mch. Co. 60
Pratt & Whitney Co..... 64
Slocomb Co., J. T.....152
Starrett Co., L. S.....153

Counters, Revolution
Grant Mfg. & Machine Co... 66
Veeder Mfg. Co.....173

Countershafts
Almond Mfg. Co., T. R.....167
Brown & Sharpe Mfg. Co..... 67
Coates Clipper Mfg. Co..... 86
Diamond Mch. Co.....105
Dill Mch. Co., T. C.....122
Dodge Mfg. Co..... 35

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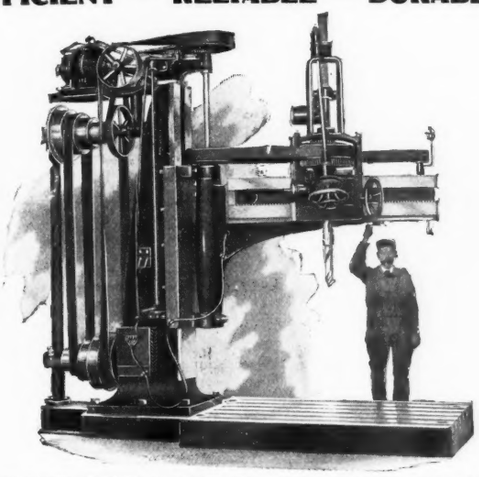

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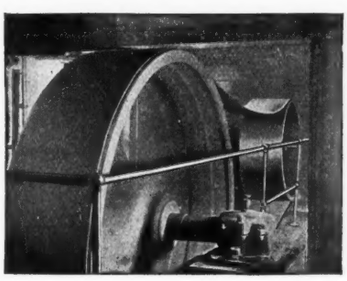

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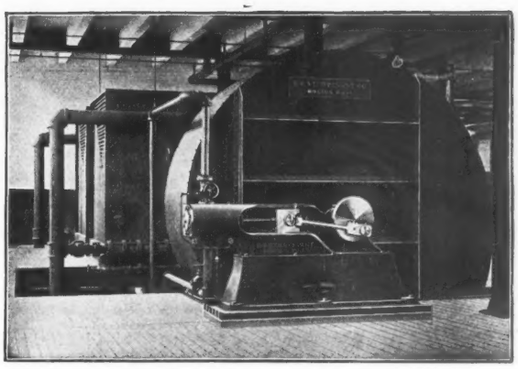

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868

Evans, G. F.....173
Garvin Machine Co.....120
LeBlond Mch. Tool Co., R. K., 191-199
Norton Grinding Co.....102
Safety Emery Wheel Co.... 98

Countershafts, Friction
Dill Mch. Co., T. C.....122
Evans, G. F. 173
Wilmarth & Morman Co.....113

Countershafts, Patented Pull
Builders Iron Fdry....Back cover

Counting Machines
Durbrow & Hearne Mfg. Co...163
Root Co., C. J. 171
Veeder Mfg. Co.....173

Couplers, Hose
Greene, Tweed & Co.....130
Ingersoll-Rand Co. 115

Couplings
Almond Mfg. Co., T. R.....167
Caldwell & Son Co., H. W....169
Davis Machine Co., W. P.... 23
Dodge Mfg. Co..... 35
National Tube Co.....117
Nicholson & Co., W. H.....169
Sellers & Co., Inc., Wm..... 92
Standard Gauge Steel Co.....155

Cranes
Brown Hoisting Mchy. Co....138
Curtis & Co. Mfg. Co.....177
Detroit Hoist & Mch. Co.....138
Manning, Maxwell & Moore, Inc. 100
Maris Bros. 138
Niles-Bement-Pond Co..4-5-65-185
Northern Engineering Works.136
Obermayer Co., S.....182
Pawling & Harnischfeger Co..139
Sellers & Co., Inc., Wm..... 92
Shepard Electric Crane & Hoist Co. 139
Toledo Bridge & Crane Co....136
Vandyck Churchill Co.....175
Yale & Towne Mfg. Co.....137

Cranes, Portable
Franklin Portable Crane & Hoist Co. 139

Crank Pin Turning Machines
Niles-Bement-Pond Co..4-5-65-185
Underwood & Co., H. B.....130

Crucibles
Dixon Crucible Co., Jos.....130
McCullough-Dalzell Crucible Co. 171
Obermayer Co., S.....182

Cupolas and Ladles, Foundry
Northern Engineering Wks...136
Oberymayer Co., S.....182

Cutters, Milling
Adams Co. 159
Barber-Colman Co. 114
Becker Milling Machine Co... 49
Boker & Co., Hermann.....119
Brown & Sharpe Mfg. Co.... 67
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Ingersoll Milling Machine Co. 22
Kearney & Trecker Co..... 10
Morse Twist Drill & Mch. Co. 60
National Tool Co.....164
National Twist Drill & Tool Co. 81
Owen Mch. Tool Co..... 83
Pratt & Whitney Co..... 64
Standard Tool Co..... 51
Tabor Mfg. Co..... 91
Union Twist Drill Co..... 29
Ward & Sons, Edgar T.....182
Whitney Mfg. Co. 88

Cutting-off Machines
Armstrong Bros. Tool Co.116-138
Bignall & Keeler Mfg. Co....181
Brown & Sharpe Mfg. Co..... 67
Davis Machine Co., W. P.... 23
Espen-Lucas Mch. Wks.....173
Fawcus Machine Co. 155
Fox Machine Co..... 63
Hurlbut-Rogers Mch. Co.....178
Lea Equipment Co.....170
McCabe, J. J. 24-184
Newton Mch. Tool Wks., Inc.. 57
Pratt & Whitney Co..... 64
Prentiss Tool & Supply Co... 52
Sellers & Co., Inc., Wm..... 92
Vandyck Churchill Co.....175
Warner & Swasey Co..... 61

Cutting-off Tools
Armstrong Bros. Tool Co..116-138
Billings & Spencer Co., 66-Inside front cover
Cleveland Twist Drill Co...31-66
O. K. Tool Holder Co.....177
Pratt & Whitney Co..... 64

Cyclometers
Veeder Mfg. Co.....173

Diamond Tools
Abrasive Material Co.....110
American Emery Wheel Wks..109
Calder, Geo. H.....111
Desmond-Stephan Mfg. Co....110
Safety Emery Wheel Co..... 98

Dies, Sheet Metal
Bliss Co., E. W.....175
Columbus Die, Tool & Mch. Co. 82
Ferracute Mch. Co.....175
Swaine Mfg. Co., F. J.....179
Waltham Machine Works.... 82

Dies, Sub-Press
Pratt & Whitney Co..... 64
Waltham Machine Works.... 82

Dies, Threading, Opening
Bickford Machine Co.....150
Boker & Co., Hermann.....119
Errington, F. A.....165
Geometric Tool Co.....111
Jones & Lamson Mch. Co...16-17
Landis Mch. Co., Inc..... 37
Modern Tool Co.....108
Pratt & Whitney Co..... 64
Wells Bros. Co..... 41

Drafting Machines
Keuffel & Esser Co.....126

Drawing Boards and Tables
Fritz Mfg. Co.....168
Keuffel & Esser Co.....126
Washburn Shops 184

Drawing Materials
Keuffel & Esser Co.....126

Drill Sockets
American Specialty Co.....177
Cleveland Twist Drill Co...31-66
Morse Twist Drill & Mch. Co.. 60
Standard Tool Co..... 51

Drill Speeders
Graham Mfg. Co.....127

Drilling Machines, Bench
Barnes Co., W. F. & John.... 87
Hoefer Mfg. Co..... 27
Pratt & Whitney Co..... 64
Prentice Bros. Co., Inside back cover
Rockford Drilling Mch. Co...145
U. S. Electrical Tool Co.... 62

Drilling Machines, Boiler
American Tool Works Co..... 14
Cincinnati Bickford Tool Co.. 26
Prentice Bros. Co., Inside back cover
Sellers & Co., Inc., Wm..... 92

Drilling Machines, Multiple Spindle
American Tool Works Co..... 14
Baker Bros. 81
Baush Mch. Tool Co..... 8
Barnes Drill Co., Inc..... 84
Baush Mch. Tool Co..... 8
Cincinnati Bickford Tool Co.. 26
Cincinnati Pulley Mchy. Co.. 63
Colburn Mch. Tool Co..... 148
Fosdick Mch. Tool Co.....149
Fox Mch. Co..... 63
Garvin Machine Co.....120
Hardinge Bros., Inc.....203
Harrington, Son & Co., Edwin 139
Henry & Wright Mfg. Co..... 79
Hill, Clarke & Co..... 45
Hoefer Mfg. Co..... 27
Kern Mch. Tool Co..... 63
Moline Tool Co.....112
Newton Mch. Tool Wks., Inc.. 57
Niles-Bement-Pond Co..4-5-65-185
Pratt & Whitney Co..... 64
Prentice Bros. Co., Inside back cover
Prentiss Tool & Supply Co... 52
Quint, A. E.....201
Reed Co., Francis.....111
Rockford Drilling Mch. Co...145
Sellers & Co., Inc., Wm..... 92
Superior Mch. Tool Co..... 79
Taylor & Fenn Co.....147

Drilling Machines, Portable
Coates Clipper Mfg. Co..... 86
Dallett Co., Thos. H.....170
General Electric Co.....133
Ingersoll-Rand Co.....115
Newton Mch. Tool Wks., Inc.. 57
Rochester Boring Mch. Co.... 83
Stow Flexible Shaft Co.....136
U. S. Electrical Tool Co.... 62
Van Dorn & Dutton Co...82-186

Drilling Machines, Radial
American Tool Works Co..... 14
Baush Mch. Tool Co..... 8
Cincinnati Bickford Tool Co.. 26
Detrick & Harvey Mch. Co... 92
Dreses Mch. Tool Co..... 56
Fitchburg Machine Works...150
Fosdick Mch. Tool Co.....149
Gang Co., Wm. E.....112
Hamilton Mch. Tool Co..... 34
Harrington, Son & Co., Edwin 139
Morris Mch. Tool Co., Jno. B.176
Mueller Mch. Tool Co.....195
Newton Mch. Tool Wks., Inc.. 57
Niles-Bement-Pond Co..4-5-65-185
Prentice Bros. Co., Inside back cover
Rochester Boring Mch. Co.... 83
Sellers & Co., Inc., Wm..... 92

Drilling Machines, Rail
Newton Mch. Tool Wks., Inc.. 57
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Standard Tool Co..... 51

Drilling Machines, Turret
Quint, A. E.....201

Drilling Machines, Upright
Albany Hardware Specialty Mfg. Co. 146
Aurora Tool Works.....146
Baker Bros. 81
Barnes Co., W. F. & John.... 87
Barnes Drill Co., Inc..... 84
Beaman & Smith Co.....15-162
Cincinnati Bickford Tool Co.. 26
Colburn Mch. Tool Co.....148
Davis Machine Co., W. P.... 23
Fosdick Mch. Tool Co.....149
Fox Mch. Co..... 63
Frontier Iron Works.....147
Garvin Machine Co.....120
Gould & Eberhardt..... 42
Hamilton Machine Tool Co... 34
Harrington, Son & Co., Edwin 139
Henry & Wright Mfg. Co..... 79
Hill, Clarke & Co..... 45
Hoefer Mfg. Co..... 27
Kern Mch. Tool Co..... 63
Knight Mchy. Co., W. B.... 188
Mechanics Mch. Co.....147
Morse Twist Drill & Mch. Co. 60
Pratt & Whitney Co..... 64
Prentice Bros. Co., Inside back cover
Rockford Drilling Mch. Co...145
Sellers & Co., Inc., Wm..... 92
Sibley Mch. Tool Co..... 78
Snyder & Son, J. E..... 3
Superior Mch. Tool Co..... 79
Taylor & Fenn Co.....147
Washburn Shops 184
Whitney Mfg. Co..... 88
Wiley & Russell Mfg. Co.....127

Drills, Center
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Morse Twist Drill & Mch. Co.. 60
Slocomb Co., J. T.....152
Standard Tool Co..... 51

Drills, Electric
General Electric Co.....133
United States Elec. Tool Co... 62
Van Dorn & Dutton Co....82-186

Drills, Flat
Whitman & Barnes Mfg. Co... 44

Drills, Hand
Coates Clipper Mfg. Co..... 86
Ingersoll-Rand Co. 115
United States Elec. Tool Co... 62

Drills, Pneumatic
Ingersoll-Rand Co. 115

Drills, Ratchet
Armstrong Bros. Tool Co..116-138
Billings & Spencer Co., 66-Inside front cover
Boker & Co., Hermann.....119
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Greene, Tweed & Co.....130
Pratt & Whitney Co..... 64
Standard Tool Co..... 51

Drills, Rock
Ingersoll-Rand Co. 115

Drying Apparatus
Sturtevant Co., B. F.....193

Drying Ovens
Steiner, E. E.....172

Dynamos
Crocker-Wheeler Co. 135
Eck Dynamo & Motor Co.....137
Fort Wayne Elec. Works.....113
General Electric Co.....133
Reliance Elec. & Eng. Co.....134
Roth Bros. & Co.....137
Sprague Elec. Wks...134-138-193
Sturtevant Co., B. F.....193
Westinghouse Elec. & Mfg. Co. 134

Electric Pyrometers, Heating Appliances, Etc.
Hoskins Mfg. Co.....187

Electrical Supplies
General Electric Co.....133
Johns-Manville Co., H. W.....129
Roth Bros. & Co.....137
Westinghouse Elec. & Mfg. Co. 134

Electrotypers
Lovejoy Co. 155

Emery and Corundum Wheels
Abrasive Material Co.....110
American Emery Wheel Wks..109
Safety Emery Wheel Co..... 98
Sterling Emery Wheel Mfg. Co. 110
Vitrified Wheel Co.....112

Emery Wheels
See Grinding Wheels.

Emery Wheel Dressers
Abrasive Material Co.....110
American Emery Wheel Wks.109
Calder, Geo. H.....111
Desmond-Stephan Mfg. Co....110
Reed Mfg. Co.....126
Safety Emery Wheel Co..... 98
Standard Tool Co..... 51
Stephan Mfg. Co., C. H.....111
Vitrified Wheel Co.....112

Engines
New Britain Mch. Co..... 82
Sturtevant Co., B. F.....193

Engines, Gas and Gasoline
Automatic Mch. Co.....142
Foos Gas Engine Co.....168
Grant Mfg. & Mch. Co..... 66

Engines, Steam
Sturtevant Co., B. F.....193

Engraving Machinery
Gorton Mch. Co., Geo.....176

Exhaust Heads
Sturtevant Co., B. F.....193

Expanders, Tube
Nicholson & Co., W. H.....169
Watson-Stillman Co. 174

Factory Equipment
Terrell's Equipment Co.....152
Western Tool & Mfg. Co.....141

Fans, Exhaust, Electric, Ventilating
Buffalo Forge Co.....130
Crocker-Wheeler Co. 135
Eck Dynamo & Motor Co.....137
General Electric Co.....133
Mechanical Appliance Co.....112
Reliance Elec. & Eng. Co.....134
Roth Bros. & Co.....137
Sturtevant Co., B. F.....193
Westinghouse Elec. & Mfg. Co. 134

Ferro-Vanadium
American Vanadium Co..... 39

Files and Rasps
American Swiss File & Tool Co. 141
Barnett Co., G. & H...Back cover
Delta File Works.....Back cover
Hammacher, Schlemmer & Co. 73
Hayes File Co.....163
Montgomery & Co.....Back cover
Nicholson File Co..... 25
Reichhelm & Co., E. P.....141
Simonds Mfg. Co.....201

File Sharpening Machines
American File Sharpener Co..140

Filing Machines
Detrick & Harvey Mch. Co... 92
Henry & Wright Mfg. Co..... 79

Fillet Cutters
Milwaukee Fdry. Supply Co..177

Fillet (Leather)
Butler, A. G.....204

Fittings, Hydraulic
National Tube Co.....117
Watson-Stillman Co. 174

Fittings, Iron
National Tube Co.....117

Fittings, Steam
National Tube Co.....117
Walworth Mfg. Co..... 3

Flanges
National Tube Co.....117

Flexible Shafts
Coates Clipper Mfg. Co..... 86
Stow Flexible Shaft Co.....136
Stow Mfg. Co.....172

Forges
Billings & Spencer Co., 66-Inside front cover
Buffalo Forge Co.....130
National Mchy. Co..... 59
Rockwell Furnace Co.....129
Sturtevant Co., B. F.....193

Forging Machines
Acme Machinery Co.....197
Ajax Mfg. Co..... 75
Beaudry & Co.....171
Bliss Co., E. W.....175
National Mchy. Co..... 59
Williams, White & Co.....179

Forgings, Drop
Billings & Spencer Co., 66-Inside front cover
Dyson & Sons, Jos.....186
Hay-Budden Mfg. Co.....206
Machinery Forging Co.....154
Page-Storms Drop Forge Co., Inside front cover
Phosphor Bronze Smelting Co.206
Williams & Co., J. H..... 97
Wyman & Gordon Co.....172

Forgings, Vanadium
American Vanadiam Co..... 39

Forming and Bending Machines
Baird Mch. Co.....174
Bliss Co., E. W.....175

Forming and Turning Machines, Automatic
Potter & Johnston Mch. Co... 33

Foundry Furnishings
Adams Co. 159
Goldschmidt Thermit Co.....201
Ingersoll-Rand Co. 115
Milwaukee Fdry. Supply Co..177
Obermayer Co., S.....182
Rockwell Furnace Co.....129
Sturtevant Co., B. F.....193

Foundry Ramming Stands
New Britain Mch. Co..... 82

Fractional Computer
Kendall, W. F.....157

Fuel Economizers
Sturtevant Co., B. F.....193

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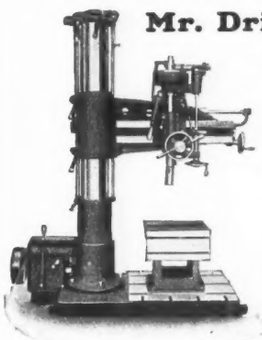

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Furnaces, Annealing and Tempering
American Gas Furnace Co....131
Best, W. N.....168
Brown & Sharpe Mfg. Co..... 67
Chicago Flexible Shaft Co..97-128
General Electric Co.....133
Rockwell Co., W. S.....168
Rockwell Furnace Co.....129

Furnaces, Coal and Oil
Best, W. N.....168
Rockwell Co., W. S.....168
Rockwell Furnace Co.....129

Furnaces, Electric
General Electric Co.....133
Hoskins Mfg. Co.....187
Obermayer Co., S.....182

Furnaces, Gas
American Gas Furnace Co....131
Chicago Flexible Shaft Co..97-128
Rockwell Co., W. S.....168
Rockwell Furnace Co.....129

Furnaces, Melting
American Gas Furnace Co....131
Best, W. N.....168
Chicago Flexible Shaft Co..97-128
Rockwell Furnace Co.....129

Furnaces, Welding
Best, W. N.....168
Rockwell Furnace Co.....129
Toledo Electric Welder Co.... 77

Gages, Recording
Bristol Co. .....Back cover
Industrial Instrument Co.....204

Gages, Steam
Bristol Co. .....Back cover

Gages, Surface, Depth, etc.
Brown & Sharpe Mfg. Co.... 67
Cleveland Twist Drill Co...31-66
Henry & Wright Mfg. Co..... 79
Morse Twist Drill & Mch. Co.. 60
Pratt & Whitney Co..... 64
Rogers Wks., Inc., John M....169
Sawyer Tool Mfg. Co.....126
Slocomb Co., J. T..... ..152
Starrett Co., L. S.....153
Wells Bros. Co..... 41

Gaskets
Greene, Tweed & Co.....130
Peerless Rubber Mfg. Co.... 94

Gear Cutting Machines, Bevel (Generator Planer)
Bilgram Machine Works.....156
Gleason Works,
Front cover-Back cover

Gear Cutting Machines, Bevel (Rotary Cutter)
Brown & Sharpe Mfg. Co..... 67
Flather Mfg. Co., E. J.....158
Gould & Eberhardt..... 42
Newark Gear Cutting Mch. Co.159
Whiton Mch. Co., D. E..... 90

Gear Cutting Machines, Bevel (Templet Planer)
Gleason Works,
Front cover-Back cover
Schuchardt & Schutte.....160

Gear Cutting Machines, Helical or Spiral
See makers of Universal Milling Machines.

Gear Cutting Machines, Helical or Spiral (Hob)
Adams Co. 159
Barber-Colman Co. 114
Carpenter-Tew Gear Co.....155
Gould & Eberhardt..... 42
Lees-Bradner Co. 36
Meisselbach-Catucci Mfg. Co..157
Newark Gear Cutting Mch. Co.159
Schuchardt & Schutte.....160

Gear Cutting Machines, Racks
See makers of Rack Cutting Machines.

Gear Cutting Machines, Spur (Gear Shaper)
Fellows Gear Shaper Co..... 50

Gear Cutting Machines, Spur (Hob)
Adams Co. 159
Barber-Colman Co. 114
Carpenter-Tew Gear Co.....155
Gould & Eberhardt..... 42
Lees-Bradner Co. 36
Meisselbach-Catucci Mfg. Co..157
Newark Gear Cutting Mch. Co.159
Reynolds Mchy. Co.....159
Schuchardt & Schutte.....160

Gear Cutting Machines, Spur (Rotary Cutter)
Brown & Sharpe Mfg. Co..... 67
Cincinnati Gear Cutting Mch. Co. 20
Flather Mfg. Co., E. J.....158
Gould & Eberhardt..... 42
Newark Gear Cutting Mch. Co.159
Newton Mch. Tool Wks., Inc.. 57
Waltham Mch. Works..... 82
Whiton Mch. Co., D. E..... 90

Gear Cutting Machines, Worms and Worm Wheels (Hob)
Adams Co. 159
Barber-Colman Co. 114
Carpenter-Tew Gear Co.....155
Gould & Eberhardt..... 42
Lees-Bradner Co. 36
Meisselbach-Catucci Mfg. Co..157
Newark Gear Cutting Mch. Co.159
Schuchardt & Schutte.....160
Morse Twist Drill & Mch. Co..60

Gears, Cut
Adams Co. 159
American Vanadium Co..... 39
Bilgram Machine Wks.....156
Boston Gear Works.....157
Brown & Sharpe Mfg. Co..... 67
Caldwell & Son Co., H. W....169
Carpenter-Tew Gear Co.....155
Cincinnati Milling Mch. Co... 69
Cullman Wheel Co.....156
Davis, Rodney 157
Dodge Mfg. Co..... 35
Earle Gear & Mch. Co.....156
Fawcus Mch. Co. 155
Fellows Gear Shaper Co..... 50
Flather Mfg. Co., E. J.....158
Foote Bros. Gear & Mch. Co..158
Frost Gear & Mch. Co.....157
Ganschow Co., Wm.....157
Gleason Works,
Front cover-Back cover
Gould & Eberhardt..... 42
Grant Gear Works.....157
Hardinge Bros., Inc.....203
Harrington, Son & Co., Edwin 139
Horsburgh & Scott Co.....158
Lea Equipment Co.....170
Lees-Bradner Co. 36
Meisselbach-Catucci Mfg. Co..157
Newark Gear Cutting Machine Co. 159
New England Gear Works....157
Newport Gear & Mch. Works.157
New Process Raw Hide Co.,
160-161
Northern Engineering Wks...136
Nuttall Co., R. D.....158
Owen Machine Tool Co..... 83
Philadelphia Gear Works, Inc.156
Spacke Mch. Co., F. W.....177
Van Dorn & Dutton Co....82-186

Gears, Molded
Caldwell & Son Co., H. W....169
Franklin Mfg. Co.....156
Horsburgh & Scott Co.....158
Philadelphia Gear Works, Inc.156
Van Dorn & Dutton Co....82-186

Gears, Rawhide
Boston Gear Works.....157
Chicago Rawhide Mfg. Co.,
Back cover
Earle Gear & Machine Co....158
Fawcus Mch. Co. 155
Foote Bros. Gear & Mch. Co..158
Ganschow Co., Wm.....157
Gould & Eberhardt..... 42
Grant Gear Works.....157
Horsburgh & Scott Co.....158
New Process Raw Hide Co.,
160-161
Nuttall Co., R. D.....158
Philadelphia Gear Works, Inc.156
Van Dorn & Dutton Co....82-186

Gears, Worm
Boston Gear Works.....157
Brown & Sharpe Mfg. Co..... 67
Carpenter-Tew Gear Co.....155
Cincinnati Gear Cutting Mch. Co. 20
Earle Gear & Machine Co....156
Fawcus Machine Co.....155
Foote Bros. Gear & Mch. Co..158
Ganschow Co., Wm.....157
Gould & Eberhardt..... 42
Horsburgh & Scott Co.....158
Newark Gear Cutting Machine Co. 159
Nuttall Co., R. D.....158
Philadelphia Gear Works, Inc.156
Van Dorn & Dutton Co....82-186

Generating Equipments, Oxygen and Oxy-Hydrogen
International Oxygen Co.....128

Generators
Crocker-Wheeler Co. 135
Eck Dynamo & Motor Co.....137
Fort Wayne Elec. Works....113
General Electric Co.....133
Reliance Elec. & Eng. Co.....134
Roth Bros. & Co.....137
Sprague Elec. Wks....134-138-193

Generators, Gas
American Gas Furnace Co....131

Graphite
Acheson Graphite Co., International 204
Dixon Crucible Co., Jos.....130

Grinders, Bench
Athol Mch. Co. 163
Builders Iron Fdry...Back cover
Diamond Mch. Co.....105
Walker & Co., O. S....Back cover

Grinders, Center
Coates Clipper Mfg. Co..... 86
Diamond Mch. Co.....105
Greenfield Machine Co..... 98
Mueller Mch. Tool Co.....195
Trump Bros. Mch. Co.....162
U. S. Electrical Tool Co..... 62

Grinders, Chucking
Bryant Chucking Grinder Co..109

Grinders, Cutter
Bath Grinder Co.....100
Becker Milling Mch. Co..... 49
Brown & Sharpe Mfg. Co..... 67
Cincinnati Milling Mch. Co.... 69
Garvin Machine Co.....120
Gould & Eberhardt..... 42
Greenfield Machine Co..... 98
Heald Machine Co.....107
Ingersoll Milling Machine Co.. 22
LeBlond Mch. Tool Co., R. K. 191-199
Modern Tool Co.....108
Norton Grinding Co.....102
Oesterlein Mch. Co..... 18
Pratt & Whitney Co..... 64
Rivett Lathe Mfg. Co.....206
U. S. Electrical Tool Co..... 62
Wells & Son Co., F. E..... 99
Wilmarth & Morman Co.....113

Grinders, Cylindrical
Bath Grinder Co.....100
Brown & Sharpe Mfg. Co.... 67
Diamond Mch. Co.....105
Greenfield Machine Co..... 98
Heald Mch. Co.....107
Landis Tool Co.....101
Morse Twist Drill & Mch. Co.. 60
Norton Grinding Co.....102
Pratt & Whitney Co..... 64

Grinders, Disc
Bath Grinder Co.....100
Besly & Co., Chas. H.....104
Diamond Mch. Co.....105
Gardner Machine Co..... 76
Heald Machine Co.....107
Hoysradt & Case.....111
Ransom Mfg. Co..... 99
Rowbottom Machine Co.....113
Safety Emery Wheel Co..... 98
Taylor & Fenn Co..... 147
Valley City Mch. Wks.....110

Grinders, Drill
Heald Machine Co.....107
Morse Twist Drill & Mch. Co.. 60
Safety Emery Wheel Co..... 98
Sellers & Co., Inc., Wm..... 92
Standard Tool Co..... 51
U. S. Electrical Tool Co..... 62
Washburn Shops 184
Wilmarth & Morman Co.....113

Grinders, Electric
Diamond Mch. Co.....105
Mechanical Appliance Co.....112

Grinders, Internal
Bath Grinder Co.....100
Brown & Sharpe Mfg. Co..... 67
Diamond Mch. Co.....105
Greenfield Machine Co..... 98
Heald Machine Co.....107
Landis Tool Co.....101
Modern Tool Co.....108
Rivett Lathe Mfg. Co.....206
U. S. Electrical Tool Co..... 62

Grinders, Knife
Diamond Mch. Co.....105
Rowbottom Mch. Co.....113
Safety Emery Wheel Co..... 98

Grinders, Electric, Portable
Coates Clipper Mfg. Co..... 86
Diamond Mch. Co.....105
General Electric Co.....133
U. S. Electrical Tool Co..... 62

Grinders, Piston Ring
Bay State Grinder Co.....113
Heald Mch. Co. 107

Grinders, Surface — Hand, Automatic
Diamond Mch. Co.....105

Grinders, Tool
Armstrong Bros. Tool Co..116-138
Barnes Co., W. F. & John... 87
Bath Grinder Co.....100
Brown & Sharpe Mfg. Co..... 67
Cincinnati Milling Mch. Co... 69
Diamond Mch. Co.....105
Gisholt Mch. Co..... 93
Gould & Eberhardt..... 42
Grant Mfg. & Mch. Co..... 66
Greenfield Machine Co..... 98
Heald Machine Co.....107
Landis Tool Co.....101
LeBlond Mch. Tool Co., R. K. 191-199
Meisselbach-Catucci Mfg. Co..157
Modern Tool Co.....108
Morse Twist Drill & Mch. Co.. 60
Newark Gear Cutting Machine Co. 159
Norton Grinding Co.....102
Oesterlein Mch. Co..... 18
Pratt & Whitney Co..... 64
Ransom Mfg. Co..... 99
Rivett Lathe Mfg. Co.....206
Rockford Drilling Mch. Co...145
Safety Emery Wheel Co..... 98
Sellers & Co., Inc., Wm..... 92
Standard Tool Co..... 51
Tabor Mfg. Co..... 91
U. S. Electrical Tool Co..... 62
Valley City Mch. Works.....110
Vandyck Churchill Co.....175
Vitrified Wheel Co.....112
Walker & Co., O. S....Back cover
Wells & Son Co., F. E..... 99
Whitney Mfg. Co..... 88
Wilmarth & Morman Co.....113

Grinding Machines, Plain, Universal
Bath Grinder Co.....100
Brown & Sharpe Mfg. Co..... 67
Greenfield Mch. Co..... 98
Hill, Clarke & Co..... 45
Landis Tool Co.....101
Modern Tool Co.....108
Norton Grinding Co.....102
Pratt & Whitney Co..... 64
Rivett Lathe Mfg. Co.....206
Roth Bros. & Co.....137
Rowbottom Mch. Co.....113
Safety Emery Wheel Co..... 98
Sterling Emery Wheel Mfg. Co. 110
U. S. Electrical Tool Co..... 62
Valley City Mch. Wks.....110
Vitrified Wheel Co.....112
Wells & Son Co., F. E..... 99

Grinding Wheels
Abrasive Material Co.....110
American Emery Wheel Wks..109
Builders Iron Fdry....Back cover
Carborundum Co. 106
Norton Co. 103
Safety Emery Wheel Co..... 98
Sterling Emery Wheel Mfg. Co. 110
Vitrified Wheel Co.....112
Whitney Mfg. Co..... 88

Gun Barrel Machinery
Diamond Mch. Co.....105
Pratt & Whitney Co..... 64
Reed Co., F. E.....121

Hack Saw Frames
Massachusetts Saw Works....173
Montgomery & Co.....Back cover
Simonds Mfg. Co. 201
West Haven Mfg. Co.....203

Hammers, Drop
Billings & Spencer Co.,
66-Inside front cover
Bliss Co., E. W.....175
Gould & Eberhardt..... 42
Niles-Bement-Pond Co..4-5-65-185
Waterbury Farrel Foundry & Mch. Co. 66
Williams, White & Co.....179

Hammers, Pneumatic
Bliss Co., E. W.....175
Dallett Co., Thos. H.....170
Ingersoll-Rand Co. 115
Sellers & Co., Inc., Wm..... 92

Hammers, Power
Beaudry & Co.....171
Bradley & Son, C. C.....170
Dienelt & Eisenhardt, Inc.....171
Merrill Bros. 16
Mumford Molding Mch. Co....182
Williams, White & Co.....179

Hammers, Steam
Buffalo Fdry. & Mch. Co.....171
Chambersburg Engr. Co.....174
Erie Foundry Co.....170
Machinery Forging Co.....154
Massillon Fdry. & Mch. Co...174
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Toledo Mch. & Tool Co.....178
Vandyck Churchill Co.....175
Waterbury Farrel Fdry. & Mch. Co. 66

Handles, Machine and Tool
Cincinnati Ball Crank Co....182
Osgood, J. L.....177

Hangers, Shafting
Brown & Sharpe Mfg. Co..... 67
Dodge Mfg. Co..... 35
Hess-Bright Mfg. Co..... 43
Royersford Fdry. & Mch. Co., 128-176
Sellers & Co., Inc., Wm..... 92
Wood's Sons Co., T. B.....203

Hardening and Tempering
American Gas Furnace Co....131
Best, W. N.....168
Chicago Flexible Shaft Co..97-128
Coes Wrench Co.....66-132
Hoskins Mfg. Co.....187
Rockwell Furnace Co.....129

Hardness Testing Instruments
Shore Instrument & Mfg. Co..162

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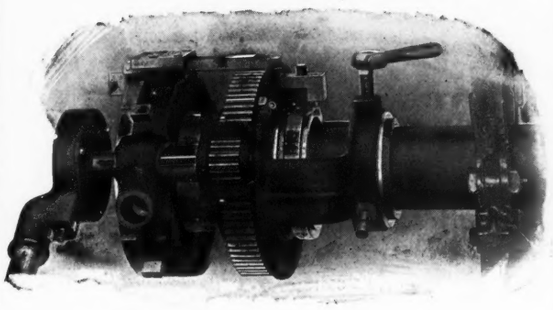

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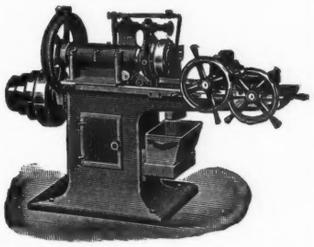

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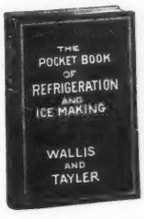

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Ajax Mfg. Co..... 75
Bliss Co., E. W.....175
Brown Co., H. B.....176
National Mchy. Co..... 59
Sellers & Co., Inc., Wm..... 92
Williams, White & Co.....179

Heaters, Feed Water
Stewart Heater Co.....172
Sturtevant Co., B. F.....193

Heaters, Oil
Rockwell Furnace Co.....129

Heating and Ventilating Apparatus
Buffalo Forge Co.....130
Sturtevant Co., B. F.....193

Hoisting and Conveying Machinery
Caldwell & Son Co., H. W...169
Detroit Hoist & Mch. Co.... 138
Dodge Mfg. Co..... 35
Sturtevant Co., B. F.....193
Yale & Towne Mfg. Co.....137

Hoists, Chain
Harrington, Son & Co., Edwin 139
Yale & Towne Mfg. Co.....137

Hoists, Electric
General Electric Co.....133
Maris Bros. 138
Northern Engineering Wks...136
Pawling & Harnischfeger Co..139
Shepard Electric Crane and Hoist Co. 139
Sprague Elec. Wks...134-138-193
Toledo Bridge & Crane Co....136
Westinghouse Elec. & Mfg. Co.134
Yale & Towne Mfg. Co.....137

Hoists, Hand
Harrington, Son & Co., Edwin 139
Mason & Co., Volney W.....138
Mumford Molding Mch. Co....182
Yale & Towne Mfg. Co.....137

Hoists, Pneumatic
Curtis & Co. Mfg. Co.....177
Detroit Hoist & Mch. Co....138
Ingersoll-Rand Co. 115
Mumford Molding Mch. Co..182
Northern Engineering Wks...136
Shepard Elec. Crane & Hoist Co. 139
Stow Flexible Shaft Co.....136

Horses, Steel
Frasse & Co., Peter A.....154

Hose
Sprague Elec. Wks...134-138-193

Hydraulic Machinery
Chambersburg Engr. Co.....174
Dudgeon, Richard 131
Waterbury Farrel Fdry. & Mch. Co. 66
Watson-Stillman Co. 174
Williams, White & Co.....179

Hydraulic Tools
Dudgeon, Richard 131
Watson-Stillman Co. 179

Indicators, Speed
Brown & Sharpe Mfg. Co..... 67
Grant Mfg. & Mch. Co..... 66
Greene, Tweed & Co.....130
Starrett Co., L. S.....153
Veeder Mfg. Co.....173

Indicators, Test
Brown & Sharpe Mfg. Co..... 67
Norton Grinding Co.....102
Starrett Co., L. S.....153

Injectors
Sellers & Co., Inc., Wm..... 92
Walworth Mfg. Co..... 3

Jacks, Hydraulic
Dienelt & Eisenhardt, Inc...171
Dudgeon, Richard 131
Watson-Stillman Co. 179

Jacks, Leveling
Binsse Mch. Co..... 11

Jacks, Planer
Armstrong Bros. Tool Co..116-138

Jigs and Fixtures
Columbus Die, Tool & Mch. Co. 82

Key Seaters
Baker Bros. 81
Burr & Sons, John T.....176
Davis Machine Co., W. P.... 23
Lapointe Mch. Tool Co..... 97
Mitts & Merrill 28
Morse Twist Drill & Mch. Co. 60
Morton Mfg. Co.....122
Niles-Bement-Pond Co..4-5-65-185
Whitney Mfg. Co..... 88

Keys, Machine
Morton Mfg. Co.....122
Olney & Warrin 168
Standard Gauge Steel Co....155
Whitney Mfg. Co..... 88

Knives, Machine
Coes Wrench Co.....66-132
Simonds Mfg. Co.....201

Knurl Holders
Graham Mfg. Co.....127
Pratt & Whitney Co..... 64

Lamps, Electric
Adams-Bagnall Elec. Co..... 84
General Electric Co.....133

Lamp Guards
McGill Mfg. Co.....187

Lathe Attachments
American Tool Wks. Co..... 14
Bradford Mch. Tool Co..... 9
Fitchburg Machine Works...150
Hendey Mch. Co. 13
LeBlond Mch. Tool Co., R. K., 191-199
Rivett Lathe Mfg. Co.....206
Seneca Falls Mfg. Co.....144

Lathe Dogs
Armstrong Bros. Tool Co.116-138
Besly & Co., Chas. H.....104
Billings & Spencer Co., 66-Inside front cover
Hammacher, Schlemmer & Co. 73
Springfield Mch. Tool Co.... 53
Williams & Co., J. H..... 97

Lathe and Planer Tools
Armstrong Bros. Tool Co.116-138
LeBlond Mch. Tool Co., R. K., 191-199
LeCount, William G.....182
O. K. Tool Holder Co.....177
Pratt & Whitney Co..... 64
Western Tool & Mfg. Co.....141
Wiley & Russell Mfg. Co.....127
Williams & Co., J. H..... 97

Lathes, Automatic Screw Threading
Automatic Machine Co.....142

Lathes, Axle
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Lathes, Bench
Builders Iron Fdry...Back cover
Elgin Tool Works.....163
Hardinge Bros., Inc.....203
Oliver Mfg. Co., W. W.....150
Pratt & Whitney Co..... 64
Reed Co., F. E.....121
Rivett Lathe Mfg. Co.....206
Seneca Falls Mfg. Co.....144
Stark Tool Co. 183
Taylor & Fenn Co. 147
Waltham Mch. Wks. 82
Waltham Watch Tool Co....146
Wells & Son Co., F. E..... 99

Lathes, Boring
Harrington, Son & Co., Edwin 139
Sellers & Co., Inc., Wm..... 92

Lathes, Brass
Acme Machine Tool Co.....142
Bardons & Oliver 38
Dreses Mch. Tool Co..... 56
Fay & Scott 46
Garvin Machine Co.....120
Springfield Mch. Tool Co..... 53
Warner & Swasey Co..... 61

Lathes, Car Wheel
Niles-Bement-Pond Co..4-5-65-185

Lathes, Chucking
Davis Mch. Co., W. P..... 23
International Mch. Tool Co. 46
Potter & Johnston Mch. Co.. 33
Pratt & Whitney Co..... 64

Lathes, Crank Shaft
LeBlond Mch. Tool Co., R. K., 191-199
Lodge & Shipley Mch. Tool Co. 6
Niles-Bement-Pond Co..4-5-65-185

Lathes, Driving Wheel
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Lathes, Engine
American Tool Works Co.... 14
Barnes Co., W. F. & John.... 87
Barnes Drill Co., Inc..... 84
Bradford Mch. Tool Co..... 9
Champion Tool Works Co.... 21
Cincinnati Lathe & Tool Co.188
Davis Machine Co., W. P..... 23
Fay & Scott 46
Flather & Co. 90
Flather Mfg. Co., E. J.....158
Garvin Machine Co.....120
Greaves, Klusman & Co..... 85
Hamilton Machine Tool Co... 34
Harrington, Son & Co., Edwin 139
Hendey Mch. Co. 13
Hill, Clarke & Co..... 45
LeBlond Mch. Tool Co., R. K., 191-199
Lodge & Shipley Mch. Tool Co. 6
McCabe, J. J.....24-184
Milwaukee Mch. Tool Co.....183
Monarch Machine Co. 188
Morris Mch. Tool Co., Jno. B.176
Niles-Bement-Pond Co..4-5-65-185
Pratt & Whitney Co..... 64
Prentice Bros. Co., Inside back cover
Prentiss Tool & Supply Co... 52
Reed Co., F. E.....121
Robbins Mch. Co.....150
Rockford Drilling Mch. Co...145
Rockford Tool Co.....80-171
Schumacher & Boye..... 18
Sellers & Co., Inc., Wm..... 92
Seneca Falls Mfg. Co.....144
Springfield Mch. Tool Co..... 53
Vandyck Churchill Co.....175
Von Wyck Mch. Tool Co..... 87
Willard Machine & Tool Co..188

Lathes, Extension
Barnes Drill Co., Inc..... 84
Fay & Scott 46
Harrington, Son & Co., Edwin 139

Lathes, Foot Power
Barnes Co., W. F. & John... 87
Reed Co., F. E.....121
Seneca Falls Mfg. Co.....144

Lathes, Gap
Barnes Drill Co., Inc..... 84
Fay & Scott 46
Harrington, Son & Co., Edwin 139
Sellers & Co., Inc., Wm..... 92

Lathes, Hand
Brown & Sharpe Mfg. Co.... 67

Lathes, Lo-Swing
Fitchburg Mch. Works.....150

Lathes, Pulley
Cincinnati Pulley Mchy. Co.. 63
Tucker, W. M. & C. F.....206

Lathes, Speed
Diamond Mch. Co. 105
Grant Mfg. & Mch. Co..... 66
LeBlond Mch. Tool Co., R. K., 191-199
Pratt & Whitney Co..... 64
Reed Co., F. E.....121
Seneca Falls Mfg. Co.....144
Washburn Shops 184
Wells & Son Co., F. E..... 99

Lathes, Turret
Bardons & Oliver 38
Davis Mch. Co., W. P..... 23
Fay & Scott 46
Gisholt Mch. Co. 93
International Mch. Tool Co... 46
Jones & Lamson Mch. Co...16 17
Niles-Bement-Pond Co..4-5-65-185
Pratt & Whitney Co..... 64
Reed Co., F. E.....121
Seneca Falls Mfg. Co.....144
Springfield Mch. Tool Co..... 53
Steinle Turret Mch. Co.....123
Warner & Swasey Co..... 61
Windsor Mch. Co. 143

Lathes, Wood
Barnes Co., W. F. & John.... 87
Fay & Scott 46
Reed Co., F. E.....121
Seneca Falls Mfg. Co.....144

Levels
Keuffel & Esser Co.....126
Starrett Co., L. S.....153

Lockers, Metal
Terrell's Equipment Co.....152

Lubricants
Acheson Graphite Co., International 204
Besly & Co., Chas. H.....104
Dixon Crucible Co., Jos.....130
Royersford Fdry. & Mch. Co., 128-176

Lubricators
Besly & Co., Chas. H.....104
Greene, Tweed & Co.....130

Machinery Dealers
Besly & Co., Chas. H.....104
Garvin Machine Co. 120
Hill, Clarke & Co..... 45
Lea Equipment Co. 170
Manning, Maxwell & Moore, Inc. 100
McCabe, J. J.....24-184
McCabe Mch. Co. 184
Motch & Merryweather Mchy. Co. 184
Niles-Bement-Pond Co..4-5-65-185
Osgood, J. L. 177
Prentiss Tool & Supply Co... 52
Toomey, Inc., Frank.....184
Vandyck Churchill Co.....175

Machinists' Small Tools
Athol Mch. Co. 163
Bemis & Call Hardware & Tool Co. ....Inside front cover
Besly & Co., Chas. H.....104
Billings & Spencer Co., 66-Inside front cover
Boker & Co., Hermann.....119
Brown & Sharpe Mfg. Co.... 67
Cleveland Twist Drill Co...31-66
Frasse & Co., Peter A.....154
Hammacher, Schlemmer & Co. 73
LeCount, W. G.....182
Millers Falls Co. 170
Montgomery & Co. ....Back cover
Morse Twist Drill & Mch. Co. 60
Niles-Bement-Pond Co..4-5-65-185
Pratt & Whitney Co..... 64
Rogers Wks., Inc., John M..169
Sawyer Tool Mfg. Co.....126
Slocomb Co., J. T.....152
Standard Tool Co. 51
Starrett Co., L. S.....153
Syracuse Twist Drill Co.....172
Walworth Mfg. Co..... 3
Wells Bros. Co. 41
Whitman & Barnes Mfg. Co. 44
Williams & Co., J. H..... 97

Machinists' Supplies
Bemis & Call Hardware & Tool Co.....Inside front cover
Besly & Co., Chas. H.....104
Hammacher, Schlemmer & Co. 73
McCabe, J. J.....24-184
Montgomery & Co.....Back cover
Osgood, J. L. 177
Whitman & Barnes Mfg. Co.. 44

Magnets, Steel
Boker & Co., Hermann.....119

Mandrels, Expanding
Morse Twist Drill & Mch. Co. 60
Nicholson & Co., W. H.....169

Mandrels, Solid
Brown & Sharpe Mfg. Co..... 67
Cleveland Twist Drill Co...31-66
Morse Twist Drill & Mch. Co. 60
Pratt & Whitney Co..... 64
Rogers Wks., Inc., John M...169
Standard Tool Co. 51
Western Tool & Mfg. Co.....141

Measuring Machines
Pratt & Whitney Co..... 64
Rogers Wks., Inc., John M..169

Mechanical Draft Apparatus
Sturtevant Co., B. F.....193

Metal
Goldschmidt Thermit Co.....201
Phosphor Bronze Smelting Co. 206

Metal Polish
Hoffman, George W. 178

Metals, Bearing
Besly & Co., Chas. H.....104
Lumen Bearing Co.....182

Micrometer Calipers
Brown & Sharpe Mfg. Co..... 67
Slocomb Co., J. T.....152
Starrett Co., L. S.....153
Wells Bros. Co. 41

Milling Attachments
Adams Co. 159
Becker Milling Machine Co... 49
Brown & Sharpe Mfg. Co..... 67
Cincinnati Milling Mch. Co... 69
Garvin Machine Co.....120
Hendey Mch. Co. 13
Ingersoll Milling Mch. Co.... 22
Kearney & Trecker Co..... 10
Kempsmith Mfg. Co. 30
LeBlond Mch. Tool Co., R. K., 191-199
Oesterlein Mch. Co. 18
Owen Machine Tool Co..... 83
Pratt & Whitney Co. 64
Rivett Lathe Mfg. Co.....206
Rockford Milling Mch. Co.... 83
Schneider & Goosmann Mch. Co. 183
Seneca Falls Mfg. Co.....144
Whitney Mfg. Co. 88

Milling Machines, Bench
Niles-Bement-Pond Co..4-5-65-185
Rivett Lathe Mfg. Co.....206
Rockford Milling Mch. Co.... 83
Stark Tool Co. 183
Waltham Watch Tool Co....146

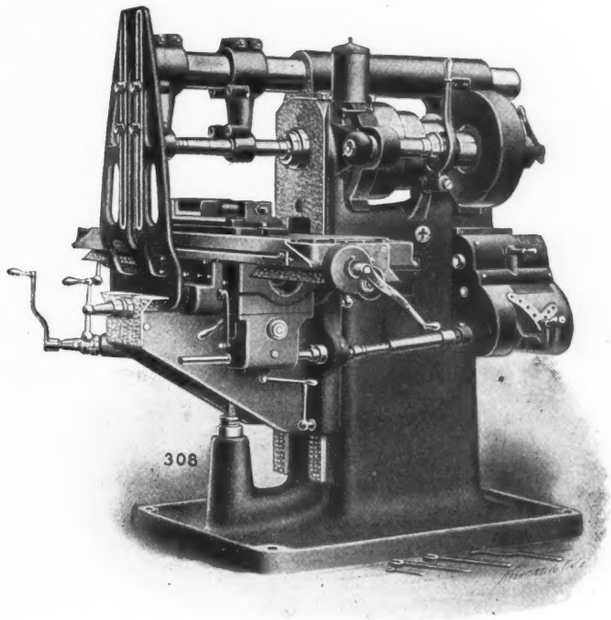
Milling Machines, Circular
Barber-Colman Co. 114

Milling Machines, Hand
Adams Co. 159
Becker Milling Machine Co... 49
Brown & Sharpe Mfg. Co..... 67
Carter & Hakes Co. 146
Cincinnati Milling Mch. Co... 69
Garvin Machine Co. 120
Pratt & Whitney Co. 64
Whitney Mfg. Co. 88

Milling Machines, Horizontal
Adams Co. 159
Beaman & Smith Co.....15-162
Becker Milling Mch. Co..... 49
Brown & Sharpe Mfg. Co..... 67
Cincinnati Milling Mch. Co.. 69
Cleveland Mch. Tool Works..123
Hendey Mch. Co. 13
Ingersoll Milling Mch. Co.... 22
Kempsmith Mfg. Co. 30
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Oesterlein Mch. Co. 18
Rochester Boring Mch. Co.... 83
Sellers & Co., Inc., Wm..... 92

Milling Machines, Plain
Adams Co. 159
Beaman & Smith Co.....15-162
Becker Milling Mch. Co..... 49
Bickford Machine Co.....150
Brown & Sharpe Mfg. Co..... 67
Chicago Mch. Tool Co..... 45
Cincinnati Milling Mch. Co.. 69
Fox Mch. Co. 63
Garvin Machine Co. 120
Hendey Mch. Co. 13
Hill, Clarke & Co..... 45
Ingersoll Milling Mch. Co.... 22
Kearney & Trecker Co. 10
Kempsmith Mfg. Co. 30
LeBlond Mch. Tool Co., R. K., 191-199
Morton Mfg. Co. 122
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Oesterlein Mch. Co. 18
Owen Machine Tool Co..... 83
Pratt & Whitney Co..... 64
Rochester Boring Mch. Co.... 83
Rockford Milling Mch. Co.... 83
Vandyck Churchill Co.....175
Waltham Watch Tool Co....146
Warner & Swasey Co..... 61
Whitney Mfg. Co. 88

Milling Machines, Portable
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Rochester Boring Mch. Co.... 83
Underwood & Co., H. B.....130



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Milling Machines, Universal
American Tool Wks. Co..... 14
Becker Milling Mch. Co..... 49
Brown & Sharpe Mfg. Co..... 67
Cincinnati Milling Mch. Co... 69
Hendey Mch. Co. 13
Kearney & Trecker Co. 10
Kempsmith Mfg. Co. 30
LeBlond Mch. Tool Co., R. K., 191-199
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Oesterlein Mch. Co..... 18
Owen Machine Tool Co..... 83
Waltham Watch Tool Co....146

Milling Machines, Vertical
Adams Co. 159
Beaman & Smith Co. 15-162
Becker Milling Mch. Co..... 49
Brown & Sharpe Mfg. Co.... 67
Cincinnati Milling Mch. Co.. 69
Hill, Clarke & Co. 45
Ingersoll Milling Mch. Co.... 22
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Owen Machine Tool Co..... 83
Sellers & Co., Inc., Wm..... 92
Vandyck Churchill Co. 175
Waltham Watch Tool Co....146

Milling Machines, Worm
Cleveland Auto. Mch. Co..... 58

Milling and Drilling Machines
Knight Mchy. Co., W. B.....188
Niles-Bement-Pond Co..4-5-65-185
Rochester Boring Mch. Co.... 83

Milling Tools (Hollow Adjustable)
Geometric Tool Co. 111
Rogers Works, Inc., J. M....169

Mining Machinery
Ingersoll-Rand Co. 115

Molding Machines
Adams Co. 159
Mumford Molding Mch. Co..182
Tabor Mfg. Co. 91

Motors, Electric
Coates Clipper Mfg. Co..... 86
Crocker-Wheeler Co. 135
Eck Dynamo & Motor Co....137
Fort Wayne Elec. Works....113
General Electric Co. 133
Mechanical Appliance Co. ...112
Reliance Elec. & Eng. Co....134
Roth Bros. & Co.....137
Sprague Elec. Wks..134-138-193
Sturtevant Co., B. F.....193
Westinghouse Elec. & Mfg. Co. 134

Nipple Threading Machinery
Bignall & Keeler Mfg. Co....181
Landis Mch. Co., Inc..... 37
Loew Mfg. Co. 176
Merrell Mfg. Co. 179
Saunders' Sons, D. 180
Standard Engineering Co....178

Nozzles
McCullough-Dalzell Crucible Co. 171

Nut Tappers
See Bolt and Nut Machinery.

Odometers
Veeder Mfg. Co. 173

Oil Cans
Delphos Mfg. Co. 177

Oil Cups
Bay State Stamping Co.....172
Besly & Co., Chas. H.....104

Oil Hole Covers
Bay State Stamping Co.....172
Tucker, W. M. & C. F.....206

Oilers
Bay State Stamping Co.....172

Oils
Acheson Graphite Co., International 204
Besly & Co., Chas. H.....104

Oxygen for Industrial Purposes
International Oxygen Co.....128

Packing
Johns-Manville Co., H. W....129
New York Belting & Packing Co. 94
Peerless Rubber Mfg. Co..... 94

Pans, Lathe
New Britain Mch. Co..... 82

Pans, Shop
New Britain Mch. Co..... 82

Pattern Letters
Butler, A. G.....204

Patterns, Wood or Metal
Ohio-National Mfg. Co. 85

Pattern Shop Tools and Machinery
Baker Bros. 81
Fox Machine Co. 63
Greaves, Klusman & Co..... 85
Hammacher, Schlemmer & Co. 73
Seneca Falls Mfg. Co.....144

Phosphor Bronze
Lumen Bearing Co. 182

Phosphorizers
McCullough-Dalzell Crucible Co. 171

Pinion Cutters
Stark Tool Co. 183

Pin Machinery
Baird Mch. Co. 174

Pipe Cutting and Threading Machines
Armstrong Mfg. Co. 180
Bignall & Keeler Mfg. Co....181
Curtis & Curtis Co.....180
Hart Mfg. Co. 197
Landis Machine Co., Inc..... 37
Loew Mfg. Co. 176
Merrell Mfg. Co. 179
Saunders' Sons, D. 180
Standard Engineering Co.....178
Stoever Fdry. & Mfg. Co....180
Trimont Mfg. Co. 181
Walworth Mfg. Co. 3
Wells & Son Co., F. E..... 99
Wells Bros. Co. 41
Wiley & Russell Mfg. Co.....127

Pipe Fitters' Tools
Butterfield & Co. 206
Cleveland Twist Drill Co...31-66
Reed Mfg. Co. 126
Saunders' Sons, D. 180
Standard Tool Co. 51
Stoever Fdry. & Mfg. Co.....180
Trimont Mfg. Co.....181
Walworth Mfg. Co. 3
Wells & Son Co., F. E..... 99
Wells Bros. Co. 41
Williams & Co., J. H..... 97

Pipes and Fittings
National Tube Co. 117
Walworth Mfg. Co. 3

Planer Attachments
Cincinnati Planer Co. 19
Gray Co., G. A. 32
Reed Co., F. E.....121

Planer Tools
Armstrong Bros. Tool Co.116-138

Planers
American Tool Works Co..... 14
Betts Mch. Co. 7
Cincinnati Planer Co..... 19
Cleveland Planer Works..... 93
Detrick & Harvey Mch. Co... 92
Fitchburg Machine Works...150
Gleason Works, Front cover-Back cover
Gray Co., G. A. 32
Hamilton Machine Tool Co... 34
Harrington, Son & Co., Edwin 139
Hendey Machine Co. 13
Knecht Planer Co. 32
Morton Mfg. Co. 122
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Ohio Mch. Tool Co.....183
Schneider & Goosmann Mch. Co. 183
Sellers & Co., Inc., Wm..... 92
Wilson Mch. Co., W. A..... 66
Woodward & Powell Planer Co. 3

Planers, Parallel
Walker & Co., O. S...Back cover

Planers, Portable
Morton Mfg. Co. 122
Newton Mch. Tool Wks., Inc. 57
Underwood & Co., H. B.....130

Planers, Rotary
Mumford Molding Mch. Co..182
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Underwood & Co., H. B.....130

Plate Rolls
Niles-Bement-Pond Co..4-5-65-185

Plumbago Goods
McCullough-Dalzell Crucible Co. 171

Pneumatic and Turntable Motors
Detroit Hoist & Mch. Co.....138

Pneumatic Tools
Bliss Co., E. W. 175
Ingersoll-Rand Co. 115
Manning, Maxwell & Moore, Inc. 100
Shepard Elec. Crane & Hoist Co. 139

Portable Tools, Repair, Railroad, etc.
Underwood & Co., H. B.....130

Power Lapping Machines
Builders Iron Foundry, Back cover

Precision Machinery
Rivett Lathe Mfg. Co.....206
Stark Tool Co. 183
Waltham Mch. Wks. 82
Waltham Watch Tool Co.....146

Presses, Arch
Bliss Co., E. W. 175
Waterbury Farrel Fdry. & Mch. Co. 66

Presses, Bench Straightening
Springfield Mch. Tool Co..... 53

Presses, Broaching
Bliss Co., E. W. 175
Swaine Mfg. Co., F. J.....179
Watson-Stillman Co. 174

Presses, Drop
Bliss Co., E. W. 175
Miner & Peck Mfg. Co., Back cover
Waterbury Farrel Fdry. & Mch. Co. 66

Presses, Foot and Hand
Bliss Co., E. W. 175
Ferracute Mch. Co. 175
Taylor & Fenn Co. 147

Presses, Forging
Bliss Co., E. W. 175
Springfield Mch. Tool Co.... 53
Swaine Mfg. Co., F. J.....179
Toledo Mch. & Tool Co.....178
Waterbury Farrel Fdry. & Mch. Co. 66

Presses, Hydraulic
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Waterbury Farrel Fdry. & Mch. Co. 66
Watson-Stillman Co. 174

Presses, Pneumatic
Springfield Mch. Tool Co.....53

Presses, Power
Ams Mch. Co., Max.....175
Automatic Machine Co. 142
Billings & Spencer Co., 66-Inside front cover
Bliss Co., E. W. 175
Ferracute Mch. Co. 175
Massillon Fdry. & Mch. Co..174
Michigan Press Co. 178
Springfield Machine Tool Co.. 53
Swaine Mfg. Co., F. J.....179
Toledo Mch. & Tool Co.....178
Vandyck Churchill Co. 175
Waterbury Farrel Fdry. & Mch. Co. 66
Willard Mch. & Tool Co.....188

Presses, Power Forcing
Barnes Co., W. F. & John.... 87
Lucas Machine Tool Co..... 71

Presses, Screw
Barnes Co., W. F. & John.... 87
Bliss Co., E. W. 175
Waterbury Farrel Fdry. & Mch. Co. 66

Presses, Sheet Metal Working
Baird Mch. Co. 174
Bliss Co., E. W. 175

Professional
Howson & Howson 111
Macdonald & Macdonald.....111
Parker, C. L. 111
Whittlesey, Geo. P.....111

Profilers
Becker Milling Machine Co... 49
Garvin Machine Co. 120
Newton Mch. Tool Wks., Inc.. 57
Pratt & Whitney Co. 64
Stark Tool Co. 183

Pulley Blocks
Yale & Towne Mfg. Co. 137

Pulleys
American Pulley Co. 136
Brown & Sharpe Mfg. Co.... 67
Caldwell & Son Co., H. W....169
Dodge Mfg. Co. 35
Mason & Co., Volney W.....138
Philips Pressed Steel Pulley Works 129
Poole Engr. & Mch. Co.....156
Saginaw Mfg. Co. 173
Sellers & Co., Inc., Wm..... 92
Wilmarth & Morman Co.....113
Wood's Sons Co., T. B.....203

Pulley Turning and Boring Machines
American Tool Wks. Co..... 14
Harrington, Son & Co., Edwin 139
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185

Pumps, Electric
General Electric Co. 133

Pumps, Hydraulic
General Electric Co. 133
Watson-Stillman Co. 174

Pumps, Pneumatic
Ingersoll-Rand Co. 115

Pumps, Steam
Ingersoll-Rand Co. 115
Waterbury Farrel Fdry. & Mch. Co. 66

Punches, Centering
Brown & Sharpe Mfg. Co..... 67
Hammacher, Schlemmer & Co. 73
Sellers & Co., Inc., Wm..... 92
Starrett Co., L. S. 153

Punches and Dies
Armstrong-Blum Mfg. Co....178
Bliss Co., E. W. 175
Globe Mch. & Stamping Co...204
Pratt & Whitney Co. 64
Richards Co., I. P. 176
Swaine Mfg. Co., F. J.....179
Watson-Stillman Co. 174
Whitman & Barnes Mfg. Co.. 44

Punches, Hydraulic
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Watson-Stillman Co. 174

Punches, Power
Armstrong-Blum Mfg. Co....178
Bliss Co., E. W. 175
Ferracute Mch. Co. 175
Long & Allstatter Co.....179
Mitts & Merrill 28
Niles-Bement-Pond Co..4-5-65-185
Royersford Fdry. & Mch. Co., 128-176
Sellers & Co., Inc., Wm..... 92

Punching and Shearing Machinery
Bliss Co., E. W. 175
Erie Foundry Co. 170
Long & Allstatter Co.....179
Massillon Fdry. & Mch. Co..174
Niles-Bement-Pond Co..4-5-65-185
Royersford Fdry. & Mch. Co., 128-176
Sellers & Co., Inc., Wm..... 92
Toledo Mch. & Tool Co.....178
Waterbury Farrel Fdry. & Mch. Co. 66
Watson-Stillman Co. 174
Williams, White & Co.....179

Rack Cutting Machines
Adams Co. 159
Fellows Gear Shaper Co..... 50
Flather Mfg. Co., E. J.....158
Gould & Eberhardt..... 42
Horsburgh & Scott Co. 158
LeBlond Mch. Tool Co., R. K., 191-199
Reed Co., F. E.....121

Racks, Cut
Brown & Sharpe Mfg. Co.... 67
Fawcus Machine Co. 155
Fellows Gear Shaper Co..... 50
Flather Mfg. Co., E. J.....158
Horsburgh & Scott Co.....158
LeBlond Mch. Tool Co., R. K., 191-199
Newark Gear Cutting Mch. Co. 159
Nuttall Co., R. D. 158
Philadelphia Gear Wks., Inc.156
Standard Gauge Steel Co....155

Racks, Tool
New Britain Mch. Co..... 82
Terrell's Equipment Co.....152
Western Tool & Mfg. Co.....141

Radiators, Japanning Oven
American Gas Furnace Co...131
Rockwell Furnace Co. 129
Steiner, E. E.....172

Rapping Plates
Milwaukee Fdry. Supply Co.177

Reamers
Boker & Co., Hermann.....119
Brown & Sharpe Mfg. Co..... 67
Brubaker & Bros., W. L.....168
Butterfield & Co. 206
Card Mfg. Co., S. W..... 55
Carpenter Tap & Die Co., J. M. .....140-Back cover
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Gisholt Machine Co. 93
Kelly Reamer Co. 125
Lapointe Mch. Tool Co..... 97
Morse Twist Drill & Mch. Co. 60
National Twist Drill & Tool Co. 81
Pratt & Whitney Co..... 64
Rogers Works, Inc., John M..169
Standard Tool Co. 51
Van Dorn & Dutton Co....82-186
Walworth Mfg. Co. 3
Ward & Sons, Edgar T.....182
Wells Bros. Co. 41
Whitman & Barnes Mfg. Co.. 44
Wiley & Russell Mfg. Co.....127

Reamers, Adjustable
Cleveland Twist Drill Co...31-66
Detroit Twist Drill Co..... 40
Kelly Reamer Co. 125
Lapointe Mch. Tool Co..... 97
Morse Twist Drill & Mch. Co. 60
Pratt & Whitney Co..... 64
Rogers Works, Inc., John M.169
Schellenbach-Hunt Tool Co...165

Reamers, Electric
Van Dorn & Dutton Co....82-186

Reamers, Pneumatic
Stow Flexible Shaft Co.....136

Reaming Stands
Skinner Chuck Co. 166

Rheostats
General Electric Co. 133
Westinghouse Elec. & Mfg. Co. 134

Rings, Weldless
Dyson & Sons, Jos. 186
Machinery Forging Co. 154

Rivet and Spike Machinery
National Mchy. Co..... 59

Riveters, Hydraulic
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Riveters, Pneumatic
Dallett Co., Thos. H.....170
Ingersoll-Rand Co. 115
Sellers & Co., Inc., Wm..... 92
Shepard Elec. Crane & Hoist Co. 139
Waterbury Farrel Fdry. & Mch. Co. 66

Riveters, Steam
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Riveting Machines
Ajax Mfg. Co. 75
Chambersburg Engr. Co.....174
Cincinnati Pulley Mchy. Co... 63
Grant Mfg. & Mch. Co..... 66
Long & Allstatter Co.....179
National Machinery Co. 59
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92

Roofing, Asbestos
Johns-Manville Co., H. W....129

Rolling Mill Machinery
Ajax Mfg. Co. 75
Fawcus Machine Co. 155

Rope Dressing and Preservative
Cling-Surface Co. 193

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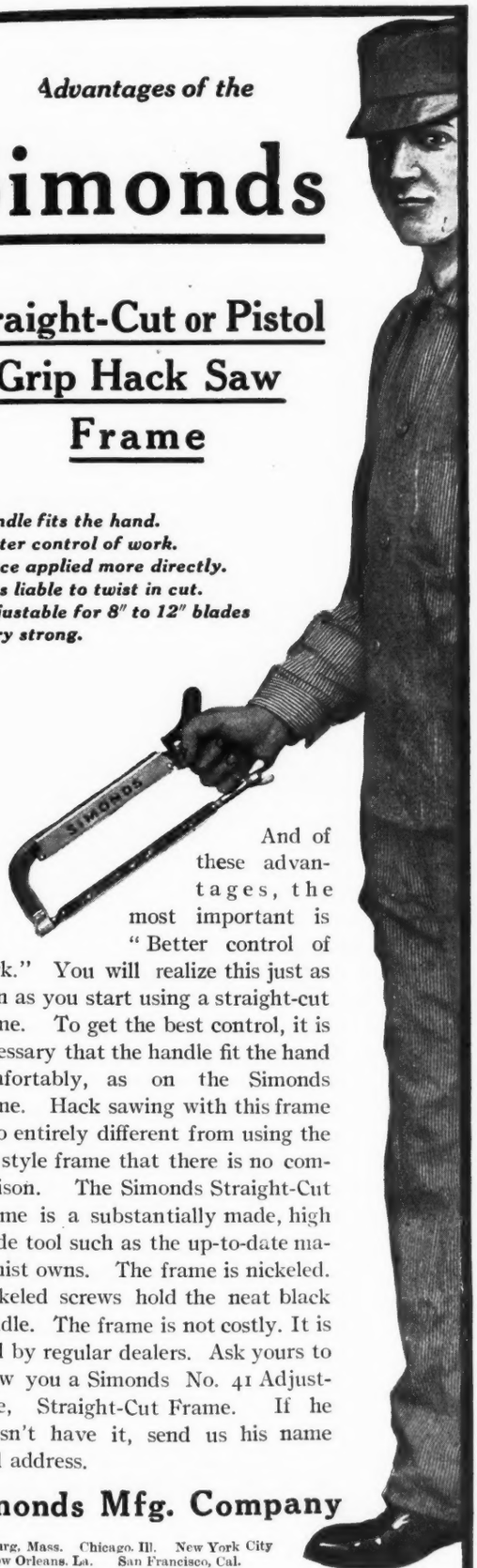
Simonds

Straight-Cut or Pistol Grip Hack Saw Frame



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Better control of work.
Force applied more directly.
Less liable to twist in cut.
Adjustable for 8" to 12" blades
Very strong.

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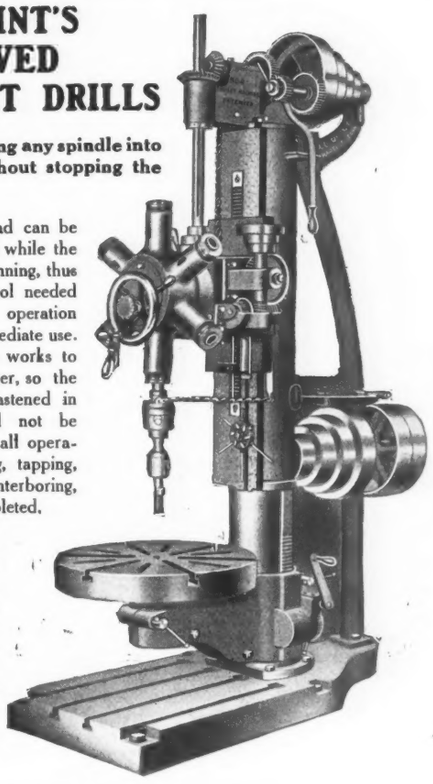

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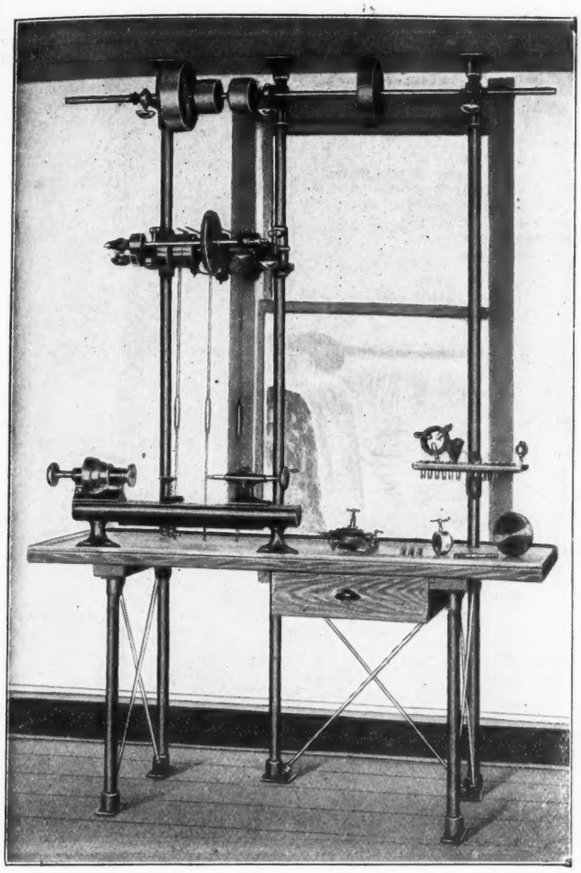
Rubber Goods
New York Belting & Packing Co. 94
Rules, Steel
Brown & Sharpe Mfg. Co..... 67
Dill Mch. Co., T. C.....122
Hammacher, Schlemmer & Co. 73
Keuffel & Esser Co. 126
Kolesch & Co. 165
Lufkin Rule Co. 195
Slocomb Co., J. T.....152
Starrett Co., L. S.....153
Saw Blades
Boker & Co., Hermann.....119
Diamond Saw & Stamping Wks. 195
Hammacher, Schlemmer & Co. 73
Massachusetts Saw Works...173
Millers Falls Co. 170
Montgomery & Co.....Back cover
Simonds Mfg. Co.....201
West Haven Mfg. Co.....203
Saw Frames and Blades, Hack
Hammacher, Schlemmer & Co. 73
Massachusetts Saw Works...173
Millers Falls Co.....170
Montgomery & Co....Back cover
Simonds Mfg. Co.....201
Starrett Co., L. S.....153
Western Tool & Mfg. Co.....141
West Haven Mfg. Co.....203
Sawing Machines, Metal
Gorton Machine Co., George..176
Hoefer Mfg. Co. 27
Lea Equipment Co. 170
Mumford Molding Mch. Co...182
Newton Mch. Tool Wks., Inc. 57
Tabor Mfg. Co. 91
Union Twist Drill Co..... 29
Vandyck Churchill Co. 175
West Haven Mfg. Co.....203
Sawing Machines, Wood
Fox Mch. Co. 63
Greaves, Klusman & Co..... 85
Seneca Falls Mfg. Co.....144
Saws, Metal Band
Crescent Mch. Co.....170
Huther Bros. Saw Mfg. Co..171
Tabor Mfg. Co. 91
West Haven Mfg. Co.....203
Saws, Power Hack
Armstrong-Blum Mfg. Co.....178
Billings & Spencer Co., 66-Inside front cover
Diamond Saw & Stamping Works 195
Espen-Lucas Mch. Works.....173
Frontier Iron Works.....147
Hoefer Mfg. Co. 27
Millers Falls Co. 170
Mumford Molding Mch. Co...182
Story, H. T.....173
Tabor Mfg. Co. 91
West Haven Mfg. Co.....203
Saws, Screw Slotting
Pratt & Whitney Co..... 64
Simonds Mfg. Co. 201
Saw Sharpening Machines
Mumford Molding Mch. Co...182
Newton Mch. Tool Wks., Inc. 57
Saw Tables
Crescent Mch. Co.....170
Seneca Falls Mfg. Co.....144
Schools
International Corr. Schools... 95
Wentworth Institute 183
Screw Cutting Tools
Brubaker & Bros., W. L.....168
Butterfield & Co. 206
Card Mfg. Co., S. W..... 55
Carpenter Tap & Die Co., J. M. .....140-Back cover
Reece Co., E. F.....183
Smart Mfg. Co., A. J..Back cover
Walworth Mfg. Co..... 3
Wells Bros. Co. 41
Screw Drivers, Automatic
Reynolds Mchy. Co.....159
Screw Machines, Automatic
Acme Machine Tool Co.....142
Brown & Sharpe Mfg. Co.... 67
Cleveland Automatic Mch. Co. 58
Davenport Mch. Tool Co....144
Dreses Mch. Tool Co..... 56
Garvin Mch. Co. 120
Milled Screw & Mch. Co.....150
National-Acme Mfg. Co. 205
Peerless Automatic Mch. Co..150
Pratt & Whitney Co..... 64
Universal Mch. Screw Co.....149
Warner & Swasey Co. 61
Windsor Mch. Co. 143
Screw Machines, Hand
Acme Machine Tool Co.....142
Brown & Sharpe Mfg. Co.... 67
Cleveland Automatic Mch. Co. 58
Garvin Mch. Co. 120
Grant Mfg. & Mch. Co..... 66
Jones & Lamson Mch. Co..16-17
Potter & Johnston Mch. Co.. 33
Rivett Lathe Mfg. Co.....206
Seneca Falls Mfg. Co.....144
Warner & Swasey Co..... 61
Wells & Son Co., F. E..... 99
Windsor Mch. Co. 143
Screw Machine Work
Davenport Mch. Tool Co.....144
Milled Screw & Mch. Co.....150
National-Acme Mfg. Co. 205
Universal Mch. Screw Co....149
Screw Machinery, Wood and Lag
Baker Bros. 81
Cook Co., Asa S. 163
Screw Plates
Besly & Co., Chas. H. 104
Butterfield & Co. 206
Card Mfg. Co., S. W..... 55
Carpenter Tap & Die Co., J. M. .....140-Back cover
Morse Twist Drill & Mch. Co. 60
Wells Bros. Co. 41
Wiley & Russell Mfg. Co.....127
Screws, Cap and Set
Electric Welding Products Co.124
Hammacher, Schlemmer & Co. 73
National-Acme Mfg. Co.....205
Standard Gauge Steel Co....155
Screws, Machine
Electric Welding Products Co.124
Hammacher, Schlemmer & Co. 73
National-Acme Mfg. Co.....205
Standard Gauge Steel Co....155
Second Hand Machinery
Davis Mch. Co., W. P..... 23
Hill, Clarke & Co..... 45
McCabe, J. J.....24-184
McCabe Machine Co. 184
Motch & Merryweather Mchy. Co. 184
Niles-Bement-Pond Co..4-5-65-185
Prentiss Tool & Supply Co.. 52
Toomey, Inc., Frank 184
Separators, Oil and Steam
Nicholson & Co., W. H.....169
Set Screws, Safety
Allen Mfg. Co., Inc.....187
Shapers
American Tool Works Co..... 14
Cincinnati Shaper Co. 20
Davis Machine Co., W. P.... 23
Fitchburg Machine Works....150
Fox Mch. Co. 63
Gould & Eberhardt 42
Hamilton Mch. Tool Co..... 34
Hendey Mch. Co. 13
Hill, Clarke & Co. 45
Kelly Co., R. A.....122
Lutter & Gies Co. 84
Morton Mfg. Co. 122
Newark Gear Cutting Mch. Co. 159
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Ohio Mch. Tool Co.....183
Potter & Johnston Mch. Co.. 33
Prentiss Tool & Supply Co... 52
Sellers & Co., Inc., Wm..... 92
Smith & Mills Co. 111
Springfield Mch. Tool Co.... 53
Stockbridge Mch. Co..... 30
Shears, Power
Bliss Co., E. W.....175
Ferracute Mch. Co.....175
Long & Allstatter Co.....179
Mitts & Merrill 28
Royersford Fdry. & Mch. Co., 128-176
Sellers & Co., Inc., Wm..... 92
Shears, Rotary
Bliss Co., E. W.....175
Detrick & Harvey Mch. Co... 92
Sheet Metal Working Machinery
Bliss Co., E. W.....175
Ferracute Mch. Co.....175
Swaine Mfg. Co., F. J.....179
Slide Rests
Betts Mch. Co. 7
National-Acme Mfg. Co.....205
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Reed Co., F. E. 121
Slotters, Machine
Baker Bros. 81
Betts Mch. Co. 7
Dill Mch. Co., T. C.....122
Newton Mch. Tool Wks., Inc. 57
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Slotters, Portable
Newton Mch. Tool Works, Inc. 57
Sockets and Sleeves
Cleveland Twist Drill Co...31-66
Morse Twist Drill & Mch. Co. 60
Standard Tool Co. 51
Union Twist Drill Co..... 29
Special Machinery and Tools
Automatic Mch. Co. 142
Baird Mch. Co. 174
Beaman & Smith Co. 15-162
Bilgram Mch. Wks. 156
Blanchard Machine Co...108-206
Bliss Co., E. W.....175
Buffalo Fdry. & Mch. Co....171
Columbus Die, Tool & Mch. Co. 82
Dallett Co., Thos. H. 170
Earle Gear & Machine Co....156
Electric Welding Products Co.124
Fawcus Machine Co. 155
Garvin Machine Co. 120
Hoefer Mfg. Co. 27
Hoggson & Pettis Mfg. Co...162
Horton Machine Co., S. E....163
Lucas Machine Tool Co..... 71
Meisselbach-Catucci Mfg. Co.157
Modern Tool Co. 108
Morrow Mfg. Co. 164
Mueller Mch. Tool Co.....195
National Mchy. Co. 59
National Tool Co. 164
Owen Machine Tool Co. 83
Pratt & Whitney Co. 64
Spacke Mch. Co., F. W.....177
Standard Engineering Co....178
Taft-Peirce Mfg. Co. 80
Taylor & Fenn Co. 147
Speed Changing Devices
Evans, G. F. 173
Springs
American Vanadium Co. 39
Sprocket Chains
Bilgram Mch. Wks. 156
Boston Gear Works 157
Philadelphia Gear Wks., Inc.156
Stamping, Sheet Metal
Bay State Stamping Co.....172
Stamps, Letters and Figures
Schwerdtle Stamp Co. 157
Stamps, Steel
Hoggson & Pettis Mfg. Co....162
Noble & Westbrook 184
Schwerdtle Stamp Co. 157
Steam Specialties
Peerless Rubber Mfg. Co..... 94
Steel
Boker & Co., Hermann.....119
Cammell Laird & Co. 155
Columbia Steel Co. 182
Firth-Sterling Steel Co.....118
Hawkridge Bros. Co. 154
Heller Bros. Co. 182
Jessop & Sons, Inc., Wm....197
Ward & Sons, Edgar T.....182
Steel Castings and Forgings
Hay-Budden Mfg. Co. 206
Jessop & Sons, Inc., Wm.....197
Steel Machinery
Boker & Co., Hermann.....119
Cammell Laird & Co. 155
Columbia Steel Co. 182
Firth-Sterling Steel Co. 118
Hawkridge Bros. Co. 154
Jessop & Sons, Inc., Wm.....197
Standard Gauge Steel Co....155
Ward & Sons, Edgar T.....182
Steel Shelving, Racks, Barrels, Tables, etc.
Terrell's Equipment Co.....152
Steel, High Speed, Tool
Allen & Co., Ltd., Edgar.....169
Boker & Co., Hermann.....119
Cammell Laird & Co.....155
Columbia Steel Co. 182
Firth-Sterling Steel Co.....118
Hawkridge Bros. Co. 154
Heller Bros. Co. 182
Jessop & Sons, Inc., Wm.....197
Standard Gauge Steel Co....155
Ward & Sons, Edgar T.....182
Steel, Self-Hardening
Allen & Co., Ltd., Edgar.....169
Steel, Vanadium
American Vanadium Co..... 39
Stocks, Die
See Taps and Dies.
Stones, Oil
American Emery Wheel Wks.109
Carborundum Co. 106
Norton Co. 103
Vitrified Wheel Co. 112
Stoppers
McCullough-Dalzell Crucible Co. 171
Straightening Machinery
Morse Twist Drill & Mch. Co. 60
Niles-Bement-Pond Co..4-5-65-185
Sellers & Co., Inc., Wm..... 92
Springfield Machine Tool Co.. 53
Stud Setters, Opening
Errington, F. A.....165
Sub-Press Dies
Waltham Mch. Wks. 82
Swaging Machines
Excelsior Needle Co. 187
Switchboards
General Electric Co.....133
Westinghouse Elec. & Mfg. Co. 134
Switches
General Electric Co.....133
Westinghouse Elec. & Mfg. Co. 134
Tachometers, Pyrometers, Etc.
Bristol Co. .....Back cover
Brown Instrument Co. 137
Industrial Instrument Co....204
Schuchardt & Schutte.....160
Veeder Mfg. Co.....173
Tapes, Measuring
Keuffel & Esser Co.....126
Lufkin Rule Co. 195
Starrett Co., L. S.....153
Tap Extractors, Broken
Walton Co. 177
Tap Holders
Brown & Sharpe Mfg. Co.... 67
Tapping Attachments
Errington, F. A.....165
Geometric Tool Co.....111
Modern Tool Co.....108
Rockford Drilling Mch. Co...145
Tapping Machines
American Tool Works Co..... 14
Baker Bros. 81
Barnes Drill Co., Inc..... 84
Beaman & Smith Co.....15-162
Cincinnati Bickford Tool Co.. 26
Errington, F. A. 165
Fosdick Mch. Tool Co.....149
Garvin Mch. Co. 120
Geometric Tool Co.....111
Gould & Eberhardt 42
Grant Mfg. & Mch. Co..... 66
Hamilton Machine Tool Co... 34
Modern Tool Co. 108
Niles-Bement-Pond Co..4-5-65-185
Pratt & Whitney Co.....64
Prentiss Tool & Supply Co... 52
Rockford Drilling Mch. Co...145
Wells & Son Co., F. E..... 99
Whitney Mfg. Co. 88
Taps and Dies
Besly & Co., Chas. H.....104
Boker & Co., Hermann.....119
Brubaker & Bros., W. L.....168
Butterfield & Co. 206
Card Mfg. Co., S. W..... 55
Carpenter Tap & Die Co., J. M. .....140-Back cover
Cleveland Twist Drill Co...31-66
Geometric Tool Co. 111
Hammacher, Schlemmer & Co. 73
Hardinge Bros., Inc.....203
Hart Mfg. Co. 197
Jessop & Sons, Inc., Wm....197
Lapointe Mch. Tool Co..... 97
Modern Tool Co. 108
Morse Twist Drill & Mch. Co. 60
Nicholson & Co., W. H.....169
Pratt & Whitney Co..... 64
Reece Co., E. F.....183
Reed Mfg. Co.....126
Saunders' Sons, D. 180
Smart Mfg. Co., A. J., Back cover
Standard Tool Co. 51
Ward & Sons, Edgar T.....182
Wells Bros. Co. 41
Wells & Son Co., F. E..... 99
Wiley & Russell Mfg. Co.....127
Taps, Collapsing
Geometric Tool Co. 111
Testing Machines
Sellers & Co., Inc., Wm..... 92
Thermit
Goldschmidt Thermit Co.....201
Thread Cutting Machinery
Automatic Mch. Co.....142
Besly & Co., Chas. H.....104
Bickford Mch. Co.....150
Billings & Spencer Co., 66-Inside front cover
Landis Mch. Co., Inc..... 37
National Mchy. Co. 59
Rivett Lathe Mfg. Co.....206
Wells Bros. Co. 41
Thread Rolling Machines
Acme Mchy. Co. 197
National Mchy. Co. 59
Tire Welders and Benders
Williams, White & Co.....179
Tools
Hammacher, Schlemmer & Co. 73
Montgomery & Co.....Back cover
Pratt & Whitney Co..... 64
Walworth Mfg. Co..... 3
Tool Cases
Gerstner & Sons, H.....152
Ohio-National Mfg. Co..... 85
Tool Holders
Armstrong Bros. Tool Co.116-138
Beaman & Smith Co.....15-162
Billings & Spencer Co., 66-Inside front cover
Cleveland Twist Drill Co..31-66
Hammacher, Schlemmer & Co. 73
O. K. Tool Holder Co.....177
Osgood, J. L.....177
Ready Tool Co.....183
Western Tool & Mfg. Co....141
Tools, Small
See Machinists' Small Tools.
Tracing Cloth
Keuffel & Esser Co.....126
Tracks, Trolley and Overhead
Yale & Towne Mfg. Co.....137
Transformers
Crocker-Wheeler Co. 135
Eck Dynamo & Motor Co.....137
Fort Wayne Elec. Wks.....113
General Electric Co. 133
Reliance Elec. & Eng. Co....134
Roth Bros. & Co.....137
Royersford Fdry. & Mch. Co., 128-176
Westinghouse Elec. & Mfg. Co.134
Transmission Machinery
American Pulley Co.....136
Caldwell & Son Co., H. W....169
Coates Clipper Mfg. Co..... 86
Dodge Mfg. Co. 35
Morse Chain Co. 89
Sellers & Co., Inc., Wm..... 92
Wood's Sons Co., T. B.....203
Trimmers, Wood
Fox Mch. Co. 63
Trolleys and Tramways
Brown Hoisting Mchy. Co....138
Harrington, Son & Co., Edwin.139
Shepard Elec. Crane & Hoist Co. 139
Yale & Towne Mfg. Co.....137
Trolley Wheels
Lumen Bearing Co. 182
Tube Expanders
Watson-Stillman Co. 174
Tubing, Seamless Steel
Almond Mfg. Co., T. R.....167
National Tube Co.....117
Ward & Sons, Edgar T.....182



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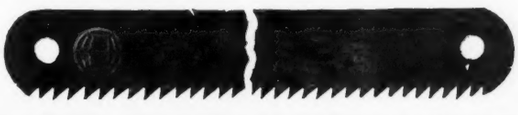

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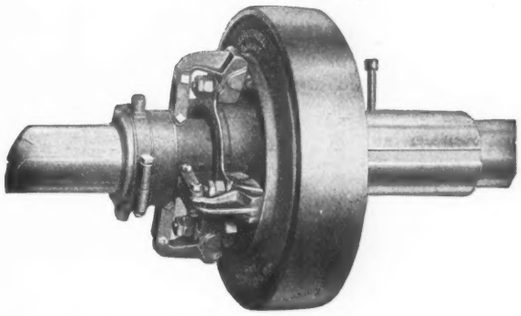

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Tumbling Barrels
Baird Mch. Co. 174
Globe Mch. & Stamping Co...204
Turntables
Sellers & Co., Inc., Wm..... 92
Turret Heads
Almond Mfg. Co., T. R.....167
Turret Machines
Acme Machine Tool Co.....142
Bardons & Oliver 38
Bradford Mch. Tool Co..... 9
Brown & Sharpe Mfg. Co.... 67
Bullard Mch. Tool Co.....189
Davis Mch. Co., W. P..... 23
Dreses Mch. Tool Co..... 56
Fay & Scott 46
Flather Mfg. Co., E. J.....158
Garvin Machine Co. 120
Gisholt Mch. Co. 93
International Mch. Tool Co... 46
Jones & Lamson Mch. Co...16-17
LeBlond Mch. Tool Co., R. K. 191-199
Lodge & Shipley Mch. Tool Co. 6
Niles-Bement-Pond Co..4-5-65-185
Potter & Johnston Mch. Co... 33
Prentice Bros. Co., Inside back cover
Seneca Falls Mfg. Co.....144
Springfield Mch. Tool Co..... 53
Steinle Turret Mch. Co.....123
Warner & Swasey Co. 61
Windsor Mch. Co. 143
Turret Machines, Vertical
Bullard Mch. Tool Co.....189
Flather Mfg. Co., E. J.....158
Twist Drills
Allen & Co., Ltd., Edgar....169
Boker & Co., Hermann 119
Cleveland Twist Drill Co....31-66
Detroit Twist Drill Co..... 40
Hammacher, Schlemmer & Co. 73
Lincoln-Williams Twist Drill Co. 140
Montgomery & Co....Back cover
Morse Twist Drill & Mch. Co. 60
National Twist Drill & Tool Co. 81
Pratt & Whitney Co. 64
Standard Tool Co. 51
Syracuse Twist Drill Co.....172
Union Twist Drill Co. 29
Ward & Sons, Edgar T.....182
Whitman & Barnes Mfg. Co.. 44
Wiley & Russell Mfg. Co....127
Unions
Dart Mfg. Co., E. M.....168
Universal Joints
Baush Mch. Tool Co..... 8
Boston Gear Works.....157
Valves
National Tube Co.....117
Watson-Stillman Co.....174
Valves, Hydraulic
Chambersburg Engr. Co.....174
Vanadium
American Vanadium Co..... 39
Ventilating Apparatus
Sturtevant Co., B. F.....193
Vise Stands
LeBlond Mch. Tool Co., R. K. 191-199
New Britain Mch. Co..... 82
Western Tool & Mfg. Co.....141
Vises, Drill
Graham Mfg. Co.....127
Vises, Metal Workers'
Armstrong Mfg. Co.....180
Brown & Sharpe Mfg. Co..... 67
Graham Mfg. Co.....127
Hammacher, Schlemmer & Co. 73
LeBlond Mch. Tool Co., R. K. 191-199
Merrill Bros. 168
Millers Falls Co.....170
Prentiss Vise Co.....168
Reed Mfg. Co.....126
Skinner Chuck Co.....166
Walworth Mfg. Co..... 3
Wyman & Gordon Co.....172
Vises, Pipe
Bignall & Keeler Mfg. Co.....181
Butterfield & Co.....206
Curtis & Curtis Co.....180
Reed Mfg. Co.....126
Saunders' Sons, D.....180
Walworth Mfg. Co..... 3
Wells & Son Co., F. E..... 99
Williams & Co., J. H..... 97
Vises, Plain
Athol Mch. Co.....163
Graham Mfg. Co.....127
Vises, Planer and Shaper
American Tool Works Co..... 14
Cincinnati Planer Co..... 19
Hendey Mch. Co..... 13
Skinner Chuck Co.....166
Vises, Universal Machine
Becker Milling Machine Co... 49
Brown & Sharpe Mfg. Co.... 67
Graham Mfg. Co.....127
Skinner Chuck Co.....166
Voltmeters
Bristol Co. .....Back cover
Welding
Davis-Bournonville Co. 151
Electric Welding Products Co.124
Goldschmidt Thermit Co.....201
Standard Welding Co..... 96
Thomson Elec. Welding Co....183
Toledo Elec. Welder Co..... 77
Winfield Elec. Welding Mch. Co. 47
Welding, Oxy-Acetylene Process
International Oxygen Co.....128
Welding Machines, Electric
Thomson Elec. Welding Co...183
Toledo Elec. Welder Co..... 77
Winfield Elec. Welding Mch. Co. 47
Welding Machines, Flue
Rockwell Furnace Co.....129
Wire-Nail and Washer Machinery
Acme Mchy. Co.....197
National Mchy. Co..... 59
Wire, Vanadium
American Vanadium Co..... 39
Wood Working Machinery
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Greaves, Klusman & Co..... 85
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Wrenches
Armstrong Mfg. Co.....180
Bemis & Call Hardware & Tool Co.....Inside front cover
Billings & Spencer Co., 66-Inside front cover
Carpenter Tap & Die Co., J. M. .....140-Back cover
Coes Wrench Co.....66-132
Greene, Tweed & Co.....130
Page-Storms Drop Forge Co., Inside front cover
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Walworth Mfg. Co..... 3
Wells Bros. Co..... 41
Wells & Son Co., F. E..... 99
Whitman & Barnes Mfg. Co... 44
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Bemis & Call Hardware & Tool Co.....Inside front cover
Greene, Tweed & Co.....130
Page-Storms Drop Forge Co., Inside front cover
Reed Mfg. Co.....126
Trimont Mfg. Co.....181
Walworth Mfg. Co..... 3
Wells & Son Co., F. E..... 99
Whitman & Barnes Mfg. Co... 44
Williams & Co., J. H..... 97
Wrenches, Ratchet
Greene, Tweed & Co.....130
Trimont Mfg. Co.....181
Wells Bros. Co..... 41
Wrenches, Tap
Besly & Co., Chas. H.....104
Butterfield & Co.....206
Card Mfg. Co., S. W..... 55
Carpenter Tap & Die Co., J. M. .....140-Back cover
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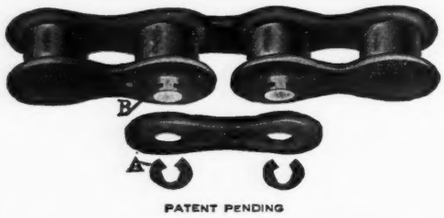

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The length can be easily altered. The clips are not a spring, will not break nor come off, and are as easily removed as a cotter pin.

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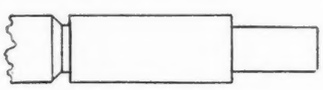
IT'S THE ACME WAY

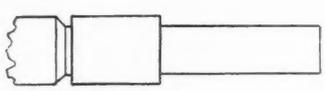
THIS PIECE

was made on an Acme Automatic, Material—Machine Steel, Diameter —2¼", Total Length of Milling Cut—8".



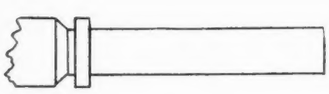
1st POSITION

Mill one-third of entire distance with end working tool, and break down stock back of head with side tool.



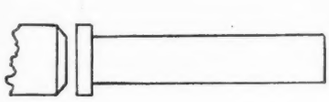
2nd POSITION

Mill half remaining distance with tool in second end position. No side tool employed.



3rd POSITION

Finish the milling cut up to the head with end working tool. The side tool position is idle.



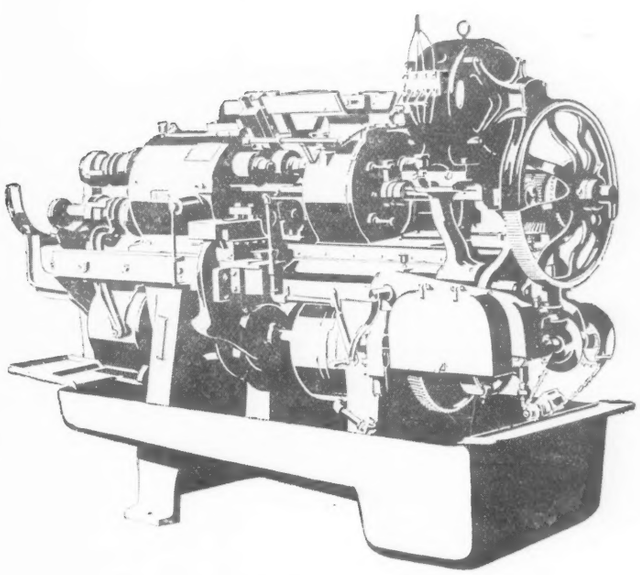
4th POSITION

Finish the cut-off operation with blade working from the side. The piece drops off complete. No end tool is used.

THIS is the way the Acme Automatic saves time on the long cuts. The piece was completed in the time required to mill one-third of the distance up to the head.

This method of using all the tools and getting at the piece in several positions at the same time shortens the time for its completion and makes any kind of screw machine work profitable on the Acme.

Ask for catalog "M."



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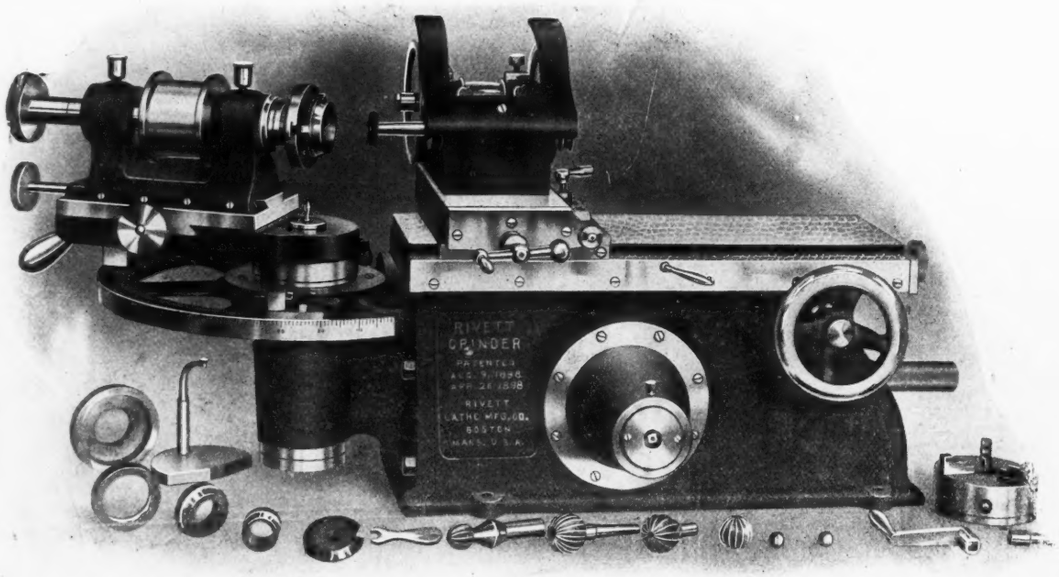

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It will do a great variety of work, which cannot be accomplished advantageously on any other grinder, especially grinding **die plates** for drawing steel where straight holes and two different angles are required, **ball cutters,** any of the various **curved milling cutters,** and any **internal or external segments of circles,** from 1-16 inch up to 8 inches diameter. The latter fact indicates its special value for **cup and cone bearings of automobiles,** and similar work.

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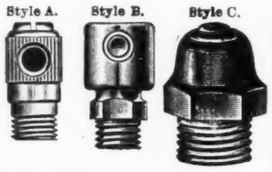

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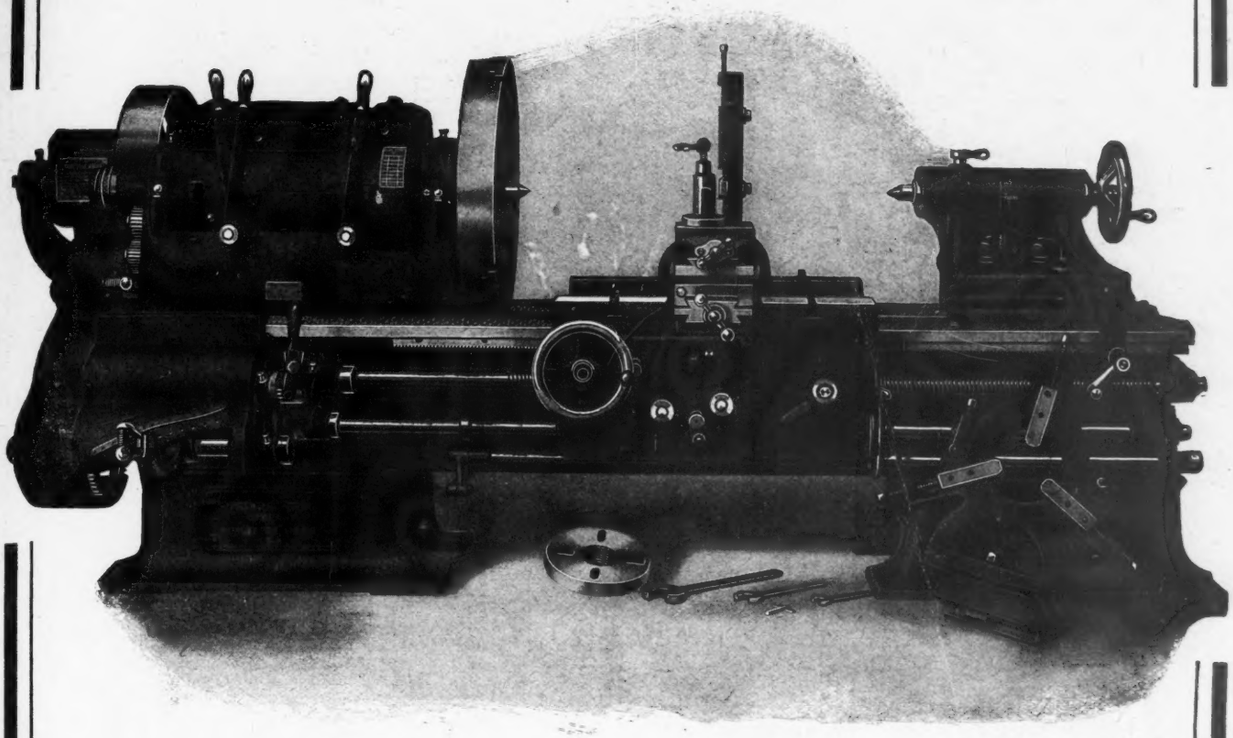

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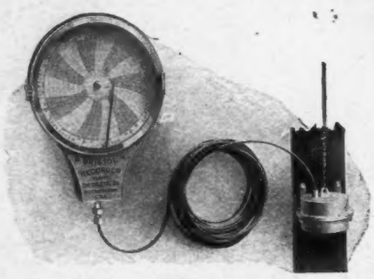

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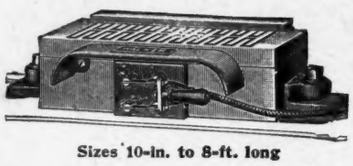

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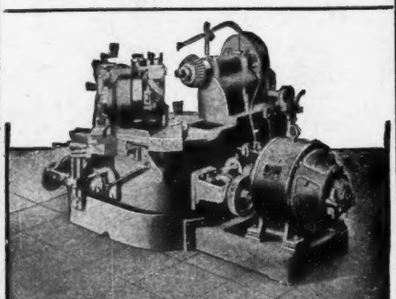

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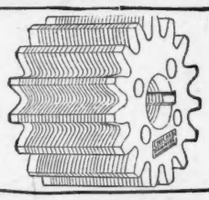

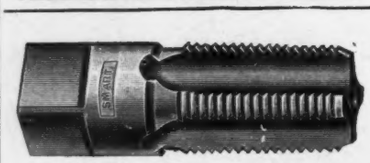

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